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A. G. NICHOLLS.—ON A SOMEWHAT RARE FORM OF CHRONIC INFLAMMATION OF THE SEROUS MEMBRANES (MULTIPLE PROGRESSIVE HYALOSEROSITIS.)

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STUDIES FROM THE ROYAL VICTORIA HOSPITAL, MONTREAL. VOL. I. NO. 3. (PATHOLOGY, I.)

ON A SOMEWHAT RARE FORM OF CHRONIC INFLAMMATION OF THE SEROUS MEMBRANES

(MULTIPLE PROGRESSIVE HYALOSEROSITIS)

BY

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I. INTRODUCTORY AND HISTORICAL.

THE subject to which I wish to draw attention in the present communication is one that has hitherto been very inadequately studied although it presents many features of clinical and pathological interest. Inasmuch as but few examples of the affection are recorded one might conclude that the disease is rare. It is, however, probably more common than has been suspected for the reason that as it is essentially chronic in nature, cases requiring years for their development, continuous observation is not often possible. And further, owing to certain niceties in diagnosis which perhaps would not suggest themselves to any whose attention had not been specially directed to the existence of the condition, cases are no doubt often confused with other affections.

The disease in question, like all others, presents minor points of variation but in its complete development is characterized by the formation of a membrane composed of dense layers of connective tissue of a peculiar cartilaginous appearance upon the various serosæ, namely, the peritoneum, pleura, and pericardium. The fibrous tissue forming the membrane in question may be several centimetres thick and differs from the loose veil-like adhesions so often met with on serous surfaces in that it forms a continuous stratified layer having a dense opalescent appearance somewhat resembling half-solidified celloidin.

This material, which has by some observers been compared to porcelain, can be readily peeled off the subjacent organs.

The viscera enclosed by this cuirass-like growth, from the effects of pressure and diminished nutrition, not only show evidence of atrophy and degeneration, but in some instances may even be fibroid. The organs involved are the liver, spleen, lungs and heart. Clinically when the liver is the part affected (perihepatitis) the disease is marked by general weakness, dyspnœa, and a gradually increasing and obstinate ascites. Anasarca comes on sooner or later and death ensues frequently from some acute complication. The general resemblance of the disease to atrophic cirrhosis of the liver is striking although in typical cases differential diagnosis is possible.

The object of the present study is to determine the true nature of the condition and to establish on a more settled basis the relationship of such local conditions as chronic perihepatitis and perisplenitis to inflammation of the serous membranes in general.

One cannot but be struck with the very hazy notions which at present prevail with regard to the subject of perihepatitis chronica and its allied condition "Glissonian" cirrhosis. The truth of this statement is readily proved by reference to the most recent text-books on medicine, where these topics receive but scant consideration; indeed the information supplied is put forth in a very tentative way and bears evidence in many instances of having been copied from previous writers upon the subject rather than being based upon personal knowledge of the condition. It is true that in some works a passing reference is made to the fact that chronic peritonitis and that localized form of it called perihepatitis may be part of a generalized inflammatory process affecting the contiguous serous membranes, but as to the exact nature of the process and the factors governing its development we are left in darkness.

No doubt much of this haziness, and in some cases even inaccuracy, is due to the fact that the literature on the subject is very scanty, being usually but little more than a record of cases, while studies on the part of the pathologist have been lacking or at least inadequate. From a study of two cases here recorded for the first time, together with a review

of those already published, I shall be glad if I can throw additional light upon the subject of chronic inflammation of of the serous membranes and present the various factors somewhat their due proportions.

Some difficulty has been experienced in selecting a name that shall express exactly the idea of a chronic inflammation characterised by hyperplastic overgrowth of connective tissue together with hyaline metamorphosis. The term "Polyorromenitis" from the Greek 'Orros *Serum*, proposed by certain Italian authors for a multiple inflammation of the serous membranes is more strictly applicable to an acute condition, and is in addition falsely derived as well as being utterly barbarous. The term "Multiserositis Chronica Hyperplastica" or "Proliferans" is perhaps less open to objection but does not entirely bring out the combination of progressive overgrowth with hyaline degeneration which gives the disease its peculiar character. I would, therefore, suggest "Multiple Progressive Hyaloserositis" as perhaps the most suitable name to employ.

While no doubt chronic hyperplastic overgrowth may be confined almost entirely to the liver capsule, it is in the vast majority of cases part and parcel of a generalised lesion affecting by a steady progression one serous membrane after another. Further, whether the disease is primary with the liver capsule or whether that organ is only secondarily involved, or whether again it entirely escapes, the present study will, I think, show that in all varieties the process is essentially of the same nature. Although for years the condition of chronic perihepatitis has been recognized by clinicians yet even now its import is not fully grasped. As will be seen later most of the cases of this disease have been recorded under the names, "Diffuse Chronic Hyperplastic Perihepatitis," "Chronic Deforming Perihepatitis" or "Zuckergussleber," all terms which suggest, though in many cases erroneously, a lesion primarily affecting the liver.

Stray references to the condition in the literature are met with as far back as 1852. In that year Budd[1] notes having observed cases of chronic perihepatitis and thought that the diminution in size and increased consistency of the liver together with the ascites, were due to the contraction of the investing fibrous membrane. Bamberger[2] relates having

seen two cases in which the compression of the liver, from thick contracting exudate upon its surface, led to contraction of the organ and all the signs of an interstitial inflammation for which it was mistaken. Thierfelder[3] states that in rare cases the greatly thickened serosa of the liver forms a thick capsule, which from its concentric contraction seems to have a great deal to do with the compression of the blood vessels of the parenchyma as well as the increased amount of connective tissue, but it is not clear from his description whether he is referring to cases of perihepatitis apart from the condition of interstitial fibrosis or not. Hamboursin[4] and Weiss[5] have also described cases falling under this category to which reference will be made shortly. To Curschmann[6] belongs the credit of emphasizing the resemblance of chronic perihepatitis to atrophic cirrhosis of the liver. This observer drew special attention to the peculiar deposit more especially as it affected the liver, a condition to which he gave the name of "Zuckergussleber" or "Icing-Liver," on account of its resemblance to the sugar upon a cake. He was the first to point out that chronic perihepatitis differed from atrophic cirrhosis of the liver in that the onset was often acute followed by a characteristically chronic progression alternating with periods of latency during which the physical signs remained stationary. Clinically the most striking features were slight general weakness, shortness of breath, and a gradually increasing and refractory ascites.

Since this classical paper appeared several more or less typical instances have been recorded of this affection of the serous membranes, notably by Vierordt[7], Riedel[10], Hale White[11], Rumpf[13], Pick[14], Schupfer[15], Siegert[17], Schmalz and Weber[18] and Rose[19]. As has been hinted Curschmann deals with the subject from the standpoint of perihepatitis and in this has been followed by the majority of the German authors. This is perhaps but natural since cases as they meet the clinician probably always present a chronic perihepatitis as the dominant feature. In fact it is only this particular localisation of the affection that can give rise to the symptom-complex to which Curschmann drew attention. In addition, however, to the "Zuckergussleber" type of Curschmann with its characteristic train of symptoms, cases exist, as I shall show, that clinically are much more obscure owing to the

peculiar distribution of the lesions, and yet in point of etiology and pathogeny fall under the same general head. Such an one is that reported by Packard[20] in a patient suffering from atrophic cirrhosis of the liver.

For the clinical notes of the following cases I am indebted to Professor James Stewart and to Dr. W. F. Hamilton. These are recorded here for the first time, and represent both the above-mentioned varieties of the affection. The second example not being of the perihepatic variety is dealt with later under the section on Etiology.

II. A STUDY OF A CASE OF ZUCKERGUSSLEBER.

Mrs. M. M., æt. 48, was admitted to the Royal Victoria Hospital under Dr. W. F. Hamilton, on April 19th, 1900. It was impossible to obtain any clinical notes as the patient died within twenty minutes of admission to the hospital. The physician who sent her in was also unable to give any details. All that could be learned was that she had been sick for two years with weakness, shortness of breath, palpitation of the heart and very extreme anasarca.

The autopsy was performed one hour after death by Prof. Adami and Dr. A. G. Nicholls.

The body was that of a middle-aged woman of rather large frame, with the usual signs of death. Post-mortem rigidity was just beginning; the dependent portions of the body were already slightly livid; the vessels upon the face, neck and forehead were greatly distended. The body as a whole was extremely œdematous, even the face being exceedingly puffy. The abdomen was greatly distended and there was fluctuation. The skin was glistening and tense; numerous large vesicles filled with clear fluid were present over the middle of the right leg and also over both knees from which serum was exuding. The body was quite warm.

On making the first incision it was found that the body wall was extensively infiltrated with clear fluid, which poured out very rapidly and in great profusion so that the tissues quickly became much less turgid. The liberation of the fluid was so extensive that the abdominal cavity after being emptied had to be emptied again five times in succession; the tissues simply poured fluid.

Thorax: Slight œdema of the larynx. On opening the thorax everything was found matted together so that the thoracic and abdominal organs were removed *en masse*. The upper portions of both lungs were adherent, but the adhesions could be separated by the hand. The lower lobes were each enclosed in dense white gristly-looking deposit varying from .5 to 3 cm. in thickness together with firm adhesions to the diaphragm. In this deposit, more especially over the diaphragmatic aspect of the right lung, were large, irregular cystic spaces containing fluid. The lungs were also firmly adherent by this dense material to the external pericardium.

Left Lung: Weight, 410 grms., rather smaller than normal, showing a few tags of adhesion at the apex. The surface of the lower lobe was densely enveloped in a white hyaline-looking material of cartilaginous consistency and of somewhat translucent appearance. In places this was about 6 mm. thick, but towards the posterior border of the lung was from 3 to 5 cm. in thickness. In this exudate were spaces filled with clear fluid and in addition considerable calcareous deposit had taken place. On section the lung was firm, greyish in color and showed chronic œdema. The bronchial cartilages were ossified; the lower lobe of the lung was compressed and airless.

Right Lung: 290 grms., very small, similar to left, also enveloped over the lower portion by dense cartilaginous material.

Heart: 275 grms., relatively small. The pericardium was firmly adherent everywhere, the adhesions being so firm about the vessels that they had to be separated with the knife. These adhesions were fibrous in character and not white and hyaline like those over the lungs; the right ventricle was distinctly hypertrophied, the wall measuring 11 mm. in thickness. The mitral orifice admitted the tips of three fingers; the valve normal; thickness of left ventricle 17 mm. The coronaries were normal; the muscle was pale brown and firm. Tho aorta was relatively large with some fibroid thickening and fatty change.

Abdomen: The abdomen contained 6,000 cc. of fluid and was enormously distended; the fluid was pale, clear, straw colored and serous in character, clotting rapidly. The parietal peritoneum was markedly thickened with numerous adhesions. The two largest bands of adhesions extended between the great omentum and the left ovary and body of the uterus; there were numerous other adhesions between the various coils of the ileum. The mesentery was distinctly shortened and thickened and as a consequence the intestines did not float upon the contained fluid but lay bunched up along the vertebral column. The thickening of the parietal peritoneum extended round the sides and over the lower surface of the liver so that the peritoneal cavity practically stopped at the edge of the ribs; the thickened membrane was firm and of a somewhat tallowy appearance very like that seen in the pleural cavity. The great omentum was scarcely recognizable as such as it formed an angular mass 5 cm. x 5 cm. and 2 cm. thick. It contained several cysts full of clear fluid.

The *Stomach* was small, containing a considerable quantity of clear fluid tinged with blood. 2 cm. below pyloric ring was a sharply defined crateriform duodenal ulcer, 11 mm. in diameter and 5 mm. deep, having a chronic appearance. The ulcer had eroded through all the walls and the floor was formed by adhesions.

Intestines: The small intestines were short, the rugæ pronounced; the walls of the appendix were much thickened, though free from adhesions; the mesenteric glands were fairly firm and somewhat reddened; large intestines normal.

Liver: 1070 grms. The organ was small, edges rounded with adhesions everywhere; there was a great hyaline thickening of the capsule more especially along the lower aspect. In consequence of this the gall-bladder was scarcely recognizable and the normal lobation of the liver was obscured. The gall-bladder was found as a narrow

channel, 4 cm. x 11 mm., with pale walls. On section the liver was brown, with no evidence of cirrhosis—a condition presumably of brown atrophy.

Spleen: 165 grms; about normal size; the capsule was greatly thickened, being converted into a whitish hyaline material similar to that found upon the liver; the organ was completely tied up in the the gastro-splenic omentum; one or two calcareous plaques were present on the surface; on section the organ was firm.

Pancreas: 90 grms. Firm and contracted.

Suprarenals: Small and fatty.

Left Kidney: 100 grms; right, 90. Surface of kidneys distinctly granular, cortex of irregular breadth; organs pale on section. Renal, mesenteric and other abdominal arteries sclerosed. Firm old adhesions about the ovaries and posterior wall of the uterus.

MICROSCOPICAL EXAMINATION.

Sections were hardened in Formol-Müller and mounted in celloidin. A considerable number of sections from each organ were made and stained by Hæmatoxylin, Hæmotoxylin-Eosin, Van Gieson, and by the Carbol-Thionin and the Gram-Weigert methods for bacteria.

Heart: Hæmatoxylin preparation:—Epicardium rather fatty, with a slight grade of fatty infiltration of the muscle; fat cells were opaque, somewhat stained and atrophic. The muscle-fibres were small and thin, the nuclei small and striation faint. The condition was that of advanced brown atrophy.

Carbol-Thionin: In addition to the previously mentioned condition occasional 'mast-zellen' were seen; numerous bacteria were present in the epicardial fat. These consisted of rather long bacilli with blunted ends; rounded, short, thick bacilli with pointed ends, diplo-bacilli and diplo-cocci; none were present in the deeper portions of the tissue.

Gram-Weigert: No bacteria seen.

Lung: Hæmatoxylin:—The fibrous investment enclosing the organ was composed of both the visceral and parietal layers of the pleura which were adherent and much thickened, the line of demarcation between the two portions being clearly indicated. Beginning at the parietal region the tissue was composed of a moderately thick layer of fat-cells together with medium-sized blood vessels; the fat had an atrophic appearance and the nuclei were more prominent than usual. In the deeper portions of this layer surrounding the blood vessels were small collections of inflammatory leucocytes or rather small round cells; most of these were mononuclear but some were polymorphonuclear. The appearance suggested a chronic progressive inflammation. Below this portion was a very thick layer composed of parallel laminæ of fibrous connective tissue; the nuclei were moderately numerous, long and narrow. This layer contained numerous fine newly-formed capillaries. No fibroblasts nor leucocytes were present, and it presented all the appearances of adult fibrous tissue. Hyaline change was present

but not to anything like the degree of that on the liver. In the deeper layer, nearest the lung, the tissue was vascular, the nuclei being more infrequent and at one portion the connective tissue presented an appearance very similar to mucinous degeneration, being pale and composed of interlacing delicate fibrillæ in which were rather large mononuclear cells, some rounded, others bipolar. Closer investigation, however, showed that the condition was one of hydropic infiltration rather than a mucinous degeneration ; several wavy bands having a homogenous and rather granular appearance resembling hyaline material were also noted.

Just below this layer was still another of dense fibrous tissue, but rather more cellular like the first. In this were also seen numerous newly-formed capillaries. The connective-tissue fibrils were considerably interlaced. Last of all was the layer of the visceral pleura recognized by the peculiar arrangement of the fibres, the well-formed blood vessels and the patches of anthracosis. This layer was practically normal.

Coming to the lung tissue itself, just beneath the pleura were numerous small areas of collapse alternating with emphysema. The alveolar walls in the interlobular septa were more fibrous than usual ; the bronchial mucosæ were well preserved and the lumina contained mucous exudate and a few leucocytes. The blood within the vessels showed moderate leucocytosis of the polymorphonuclear variety. In the alveolar spaces were numerous catarrhal cells loaded with anthracotic and blood pigment ; there was no special congestion.

Carbol-Thionin : Sections showed the same features as the last with the addition that numerous " mast-zellen " were seen in the most superficial layer of the fibrous deposit ; these were absent in the more fibrous layers and scanty in the visceral pleura. Numerous bacteria were seen, particularly in the superficial pleural layer. The deeper portions of the fibrous investment were, however, free. In the alveoli, bronchi and blood vessels were seen numerous bacteria consisting of delicate long bacilli, coarser bacilli with rounded ends, diplo-bacilli and diplo-spherules ; those in the alveolar spaces were entangled in the mucous or enclosed within catarrhal cells, thus pointing to a vital process. Those in the blood vessels were very scanty and did not form emboli.

Gram-Weigert : No bacteria noted.

Liver : Hæmatoxylin : — Sections were taken from the capsular portion and from different portions of the liver substance. The superficial sections presented a dense deposit of fibrous tissue upon the capsular surface ; this was laid down in well-defined parallel laminæ. The tissue was very dense and the nuclei relatively few. Blood vessels were absent except in the deeper layer. With the high power the nuclei appeared to be lying in small fissures, though this was probably an artefact. The fibrillæ were much swollen and presented a dense hyaline appearance, translucent and almost structureless, somewhat different from that of the thickened pleuræ. For the most part the fibres were simply attached to the Glisson's capsule so that the relative boundaries were readily made out, but here and there there was actual fusion of the two and the layers were practically indistinguishable. In several

places there were spaces to be seen between the capsule and the investing membrane lined with flattened endothelial cells. Some of these contained lymphocytes and polymorphonuclear leucocytes and appeared to be lymph spaces.

The Glisson's capsule itself was a little thickened, dense looking, and was thrown into shallow folds. Here and there between the Glisson's capsule and the fibrous investment were small collections of leucocytes and similar masses could be seen just beneath the capsule ; These were in no way striking in amount. The liver tissue proper showed the following characters in all the preparations :—

There was considerable atrophy of the parenchyma as shewn by the fact that the hepatic cells in places were small and shrunken-looking, the capsule was wrinkled and the portal sheaths were relatively more numerous than usual. Certain of the liver cells showed slight fatty degeneration, especially near the capsule ; there was slight irregular congestion of the organ. The portal sheaths were uniformly rather large and prominent, the fibrous tissue, however, was very dense and there were no fibroblasts, leucocytes or pseudo-bile capillaries to be seen so that the thickening was not due to cirrhosis, but was certainly relative. Blood vessels and bile passages were normal. The liver cells were slightly pigmented.

Carbol-Thionin :—Hosts of bacteria were present upon the outer portion of the fibrous layer ; none were seen in the deeper portions ; the vessels were free from germs. The blood showed marked polymorphonuclear leucocytosis.

Gram-Weigert :—No bacteria seen.

Sections stained by the special method for tubercle bacilli failed to show them.

Spleen : Hæmatoxylin :—The spleen atrophied, the trabeculæ being relatively more numerous than usual ; the capsule was irregularly thickened and covered with tags of old adhesions. The thickening of the capsule was due to a proliferation of fibrous tissue, but more cellular than in the case of the pleuræ and the Glisson's capsule. No hyaline or other degeration was observed. The Malpighian bodies and the spleen pulp showed no abnormality.

Carbol-Thionin : In the blood vessels were great numbers of bacteria consisting of coccoids, short ovoids, diplococci, stumpy bacilli with pointed ends, and a larger thick bacillius with rounded ends. The spleen pulp was free.

Gram-Weigert : No bacteria noted.

No tubercle bacilli were found on special staining.

Mesenteric Glands : All sections showed hyperplasia ; no bacteria were observed.

Pancreas : Hæmatoxylin :—The tissue was well preserved, well stained and apparently normal.

Carbol-Thionin : A white thrombus was present in one of the larger vessels ; bacteria, chiefly rather long delicate bacilli with rounded ends slightly curved and sometimes forming filaments were found in many vessels together with occasional large cocci. In the ducts and the interstitial tissue were numerous delicate bacilli varying greatly in length.

Gram-Weigert : No bacteria.

Suprarenal: Hæmatoxylin :—Organ of normal size, the medullary portion congested ; there was a moderate amount of fatty degeneration of the cortex and some pigmentation of the medulla. The capsule was slightly thickened and in places the normal appearance of the capsule could be made out with a distinctly marked layer of very vascular newly formed fibrous tissue lying upon it ; there was, however, in this portion no evidence of lamination or hyaline degeneration of this extra tissue. A few of the arterioles within the surrounding fat showed marked thickening of their middle coats with some narrowing of the lumina.

Carbol-Thionin :—Numerous rather long thin bacilli with rounded and often slightly bulging ends were present in the capsule deep down between the lobules of the gland and apparently due to an extension of infection from the peritoneal cavity.

Gram-Weigert :—No bacteria seen.

Kidney: Hæmatoxylin :—The organ was considerably congested throughout ; just beneath the capsule were a few areas of round-celled infiltration, the fibrous connective tissue was not on the whole much increased ; only along the larger vessels was there any considerable evidence of fibrous hyperplasia. A few of the glomeruli showed fibrous degeneration and pericapsular cirrhosis. The epithelium of the secreting tubules was cloudy ; and certain of the straight tubules were considerably dilated and the lining cells flattened as if from obstruction ; certain of the medium sized arterioles showed distinct thickening of the intima.

Carbol-Thionin : No bacteria.

Gram-Weigert : No bacteria.

BACTERIOLOGICAL EXAMINATION : Agar cultures from the peritoneal fluid, pericardial fluid and heart-blood, sterile. Agar cultures from the Spleen gave a bacillus of the Colon group. Broth culture from liver, pure growth of staphylococcus pyogenes albus.

ANATOMICAL DIAGNOSIS.

Chronic Hyperplastic Inflammation of the Serous Membranes, particularly of the Pleuræ, the Abdominal Cavity, and to a less extent the Pericardium ; Chronic Proliferative Perihepatitis and Perisplenitis ; Adherent Pericardium ; Bilateral Pleural Adhesions ; Atrophy and Chronic Œdema of Lungs ; Acute Bronchitis ; Brown Atrophy of Heart and Liver ; Hypertrophy of the Right Ventricle ; Slight Atheroma of Blood Vessels; Slight Chronic Interstitial Nephritis ; Extreme Ascites and General Anasarca ; Chronic Duodenal Ulcer ; Terminal Infection.

A study of this case shows very clearly that the chronic preliferative process upon the serous membranes is of Cursch-mann's "zuckerguss" type. Owing to the unfortunate deficiency in clinical data I am unable to say in what special way the affection developed, but the history so far as we know it, the enormous ascites, the absence of cirrhotic changes in the

liver and the characteristic hyaline thickening of the serosæ, prove it to be a typical example of the condition.

THEORIES AS TO CAUSATION.

Before passing on to the consideration of the recorded cases, in order to guide us in the critical analysis, it will be well to refer briefly to the main views advanced as to the nature of the "zuckerguss" condition.

The majority of authors regard the process as an inflammatory one. Curschmann pointed out the acute onset with inflammatory symptoms in his case and the most careful observers since his time have explained the condition in the same way. As will be seen, my own studies strongly corroborate this conclusion. More than a passing interest, however, attaches to the views of Pick (loc. cit.) inasmuch as they diverge widely from those of the majority. Under the term "Pericarditic Pseudo-Cirrhosis of the Liver" Pick describes a condition in which, owing to the presence of pericardial synechiæ, there develope not the usual signs of general circulatory disturbance but rather a marked stasis in the liver and portal circulation, leading to cyanotic atrophy and induration of the liver with marked ascites. In his opinion the ascites and the "zuckerguss" condition of the various organs are due to cardiac cirrhosis of the liver. Into this category of "pericarditic pseudo-cirrhosis" Pick would place the cases of Curschmann and Rumpf. In how far his contention is correct will be gathered from what follows.

Brief reference also should be made at this point to the views of Hale White[11]. He has recorded twenty-two cases of chronic perihepatitis occurring at Guy's Hospital, and points out the close association of chronic peritonitis with the condition. Owing to the frequent presence of granular nephritis in these cases he is of the opinion that chronic nephritis is the most important etiological factor in the production of the peritonitis. In looking up his paper I find that his cases are unfortunately only reported in outline so that it is usually not at all clear whether the chronic perihepatitis to which he refers was the sole lesion or whether other serous membranes were affected as well. Only two of his cases, those included in our list, can be placed with fair certainty in the class of pro-

gressive multiserositis, and these are inadequately reported for our purpose. His cases occurred between the ages of twenty-nine and sixty-eight. The proportion of males to females affected was thirteen to eight. Gout was present in four cases; a gouty family history in two; tuberculosis in one; alcoholism in six cases; and syphilis in three. Peritonitis was present in seventeen instances and was never found to be due to tuberculosis or new growth. Jaundice was rare. The kidneys were granular in nineteen instances; normal in two, and amyloid in one. Ascites was a constant feature. With regard to the peritoneum and omentum, he gives one description as a sample of all cases: "The peritoneum is converted into a thick, tough layer, matting all the intestines together and covering them with a thick, fibrous apron. The omentum was all matted up into a thick lump, two inches broad, below the stomach." Perisplenitis was present in fourteen cases and in only two was it said to be absent. The liver was usually found to be small but never cirrhotic; in two cases it was amyloid. Hale White does not think that the ascites in these cases is due to pressure upon the intra-hepatic portal radicals, for in no case did he find the portal vein dilated, but rather that the condition is due to chronic peritonitis.

It is evident from the description given of the morbid appearances that Hale White's cases are to be regarded as examples of chronic perihepatitis and most of them as "Zuckergussleber"; the thickening of the liver capsule, the chronic peritonitis and the matted-up omentum, together with the ascites, seem clearly to indicate this condition, so that his conclusions are important so far as they go. His views as to the causative value of chronic nephritis in these formative inflammations are worthy of consideration, as his experience seems to differ in this respect from that of the other authorities, and the relationship which he suggests is not even hinted at in work hereto published. A study of the various cases recorded, abstracts of which are now given, will, I think, clear up these debatable points.

In addition to the case just recorded I have been able to collate thirteen more for the purposes of this research

III. ABSTRACTS OF RECORDED CASES.

Case I. (Hamboursin.)

A female, æt. 28. Patient was attacked first with disturbance of digestion, pain in epigastrium and gradually increasing ascites. When admitted into the hospital the ascites was enormous, and there was great enlargement of the liver ; the heart was normal and there was no fever. Paracentesis was repeatedly performed. Later, cyanosis of the face, dyspnœa and hypertrophy of the heart set in. *Autopsy.*—Liver enclosed in a capsule 1 cm. thick, of cartilaginous hardness ; the organ was small, congested, with rounded edges and there was some thickening of the interlobular connective tissue. The right lung was adherent at its base, and the right side of the heart adherent to the base of the pericardium. The pericardium contained fluid, and there was great ascites.

Case II. (Weiss.)

A female, æt. 14. History of typhoid fever one year before onset. The first symptoms were shortness of breath and gradually increasing ascites. The liver was greatly swollen, the spleen slightly so. There was exudation into the right pleural cavity. Digestive tract normal. The pleurisy and ascites remained constant in amount. The dyspnœa necessitated repeated punctures. There was moderate œdema of the extremities before death, which ensued from pneumonia. *Autopsy.*—Peritoneum greatly thickened, particularly over the liver ; the liver and spleen were adherent to the diaphragm. Both were enlarged. Dense fibrous adhesions existed between the heart and the pericardium. There was sero-fibrinous exudate in the right pleura and the right lung was compressed. The left pleural cavity was obliterated. No cirrhosis of the liver.

Case III. (Curschmann.)

A female, æt. 56½. Illness began with a rigor and pain in the epigastrium ; the liver region was swollen and tender ; after the acute symptoms had passed off there remained anorexia, fulness and a sense of pressure in the abdomen, constipation alternating with diarrhœa. Repeated paracentesis. In later attacks the liver diminished in size and the spleen enlarged. There was partial recovery, and after a course of 6½ years the patient was seized with rigors, vomiting, remittent fever and apparently fresh peritonitis with left sided pleurisy. The previous health of the patient had been good, and there was no history of alcoholism or syphilis. *Autopsy.*—The upper portion of the peritoneal membrane was thickened and of a dense white pearly appearance ; this also enveloped the anterior wall of the abdomen, the liver, spleen and the kidney. The liver was small and hard, and the edges thick ; it was surrounded by a dense fibrous investment, 4 to 5 mm. thick ; there was no cirrhosis of its substance. The pericardium was obliterated and the right pleura and the tissues of the anterior mediastinum were thickened. The spleen was globular in shape and enlarged to twice its size. The cause of death was a recent tuberculous peritonitis.

Case IV. (Vierordt.)

A female, æt. 28. Patient was taken with acute articular rheumatism, and three years later developed slight transient œdema, which finally became permanent; ascites also set in, gradually becoming extreme. One year later laparotomy was performed followed by cessation of the symptoms. Two years later an attack of acute peritonitis occurred, followed three months later by more extreme ascites and œdema. No pleurisy was recognized. There was a systolic murmur at the heart apex. Death occurred from purulent peritonitis. *Autopsy* showed acute fibrinous peritonitis in Douglas' pouch and in the lower half of the abdomen. The liver and spleen were diminished one-third in size and covered with a dense milk-white membrane. Both pleural cavities were obliterated by dense adhesions as was also the pericardium. The right side of the heart was hypertrophied and dilated and adherent to the pericardium by dense calcareous plates. The left ventricle was of normal size. The liver was adherent, and its capsule was thickened in spots, which were of a milky white color. The hepatic vein was enormously dilated and the liver was nutmeg. No cirrhosis of the liver was noted.

Case V. (Riedel.)

Male, æt. 19. Illness apparently began at age of four following an attack of whooping-cough; characterised by a gradual increasing ascites without other special disturbance. Was aspirated in the twelfth year and again in the fourteenth. No history of icterus or disturbance of digestion. When admitted to the hospital there were present cyanosis, extreme ascites and œdema of the legs, high fever and moderate albuminuria. *Autopsy.*—Ascites extreme, chronic peritonitis, bilateral pleuritis deformans, "zuckerguss" liver and spleen, complete pericardial synechia; tuberculosis and cirrhosis of the liver were excluded.

Case VI. (Hale White.)

Male, æt. 56. Complaints were; swelling of the abdomen and legs; pain in epigastrium. The illness began two months before admission with difficulty in micturition and swelling of the ankles; later ascites. There was a history of alcoholism but no syphilis.

On admission the ascites was of great extent and the legs were œdematous; the apex beat of the heart was made out to be one inch outside of the nipple line; the liver could not be made out. Albuminuria was present on the day of admission; the patient was tapped and the albuminuria disappeared. He finally developed bronchitis and pleurisy and died about five months from onset of illness.

The autopsy showed that there was universal chronic peritonitis with perihepatitis; the liver was not cirrhotic.

Case VII. (Hale White.)

Male, æt. 46. Complaints were; swelling of the abdomen and abdominal pain, which began one week before admission. There was a history of alcoholism but no syphilis.

On admission the tongue was furred, the appetite good, the bowels regular ; free fluid was made out in the abdomen. The heart sounds were normal ; the liver could not be palpated. The urine contained no albumin. The ankles and the lower part of the legs were œdematous. On the thirty-seventh day of the illness a pleuritic rub was made out upon the left side.

Autopsy : The abdominal cavity contained 15¾ pints of clear straw-colored fluid ; the liver was very small, the capsule thick and opaque, presenting a typical example of perihepatitis ; the organ was adherent to the diaphragm in places, but was not cirrhotic. The capsule of the spleen was also dense and thick and the organ weighed seven ounces. Everywhere there was well marked chronic peritonitis. Pleuritic adhesions were present at the bases of both lungs. The cortex of the kidneys was thin.

Case VIII. (Rumpf.)

Female, æt. 33. Consulted him first in 1869 ; four days previously had been taken ill with shortness of breath, lassitude, anorexia and palpitation of the heart, which was particularly troublesome on stooping. There had been cessation of the menses for four years with occasional bloody expectoration and nose-bleeding at the periodical times. Temperature 38°C. There was a loud systolic murmur at the apex of the heart. The case was regarded as being acute pericarditis. She gradually improved but came under observation again in 1870. The abdomen was greatly distended with fluid and palpitation of the heart troubled her on exertion ; the left leg was œdematous and the superficial veins dilated. The skin was livid and in some places there were small suggillations. The urine was free from albumin. No murmurs heard at the heart. There was dulness in the right thoracic cavity ; the spleen was slightly enlarged ; the liver was enlarged and smooth ; after tapping, a round tumor the size of the fist was felt to the left of the umbilicus. In 1872 the abdominal distension was so great that she again had to be tapped. No evidences were found of any inflammatory disturbance in the abdomen and the patient remained free from fever. The removed fluid was always bright yellow and somewhat cloudy, very rich in albumin and on standing formed moderately numerous threads of fibrin ; its specific gravity was 1009. The patient was able to attend to her household duties up to the last year of her life. She was tapped altogether 301 times. Death occurred in 1885.

Autopsy : Diffuse chronic perihepatitis hyperplastica ; compression of the liver; chronic perisplenitis and peritonitis parietalis hyperplastica ; diffuse chronic pericarditis hyperplastica with obliteration of the pericardium ; chronic mediastinitis ; right chronic pleuritis hyperplastica exudativa ; ascites ; relative insufficiency of the tricuspid valves ; œdema of the lungs ; healing ulcer of the leg. The liver was reduced to half its normal size but presented no signs of cirrhosis ; the portal vein was of normal size though its branches were perhaps a little dilated. The deposit on the various organs everywhere had a smooth glistening white appearance resembling the appearance which would be produced by the solidification of some semi-fluid or viscid substance.

Case IX. (Pick.)

A male, æt. 47. An old alcoholic; pericarditis in 1889; in 1890 a left-sided pleurisy with enlarged liver; ascites developed and persisted till admission into hospital in 1892 in spite of repeated tappings. No murmurs were heard over the heart. When admitted to hospital he had great ascites, slight œdema of the legs, the liver was not specially enlarged. Death was due to pneumonia. *Autopsy:* Peritoneum in general showed fibrous thickening more especially over liver and spleen The left lung was adherent, the right normal. Old pericardial synechiæ. The liver was of normal size and presented microscopically some increase in the interlobular fibrous tissue and of that around the centrilobular veins.

Case X. (Schupfer.)

Male, æt. 47. History of malaria at age of 20 and at 39; at age of 43 had slight fever and stabbing pain in right hypochondrium, later, over the whole of the abdomen and about the sternum; this lasted six weeks. Gradual development of ascites and œdema necessitating aspiration. When admitted to hospital he had extreme ascites; the liver was diminished in size and the spleen just palpable. No fever; digestive tract normal. Discharged improved and went about his work for the next two years. Liver remained small and spleen gradually increased in size; extreme ascites was constant; no fever.

Autopsy: Synechia of both pleuræ and pericardium; chronic peritonitis, perihepatitis and perisplenitis; hæmorrhagic pneumonia. The capsule of the liver was thickened and there was slight extension of the process to the parenchyma. No cyanotic atrophy and no dilatation of central veins was present. There was no increase in the periportal fibrous tissue; the liver was not specially diminished in size and was not typically "zuckerguss."

Case XI. (Siegert.)

Male, æt. 19. History of syphilis in the father. Measles at the age of 4 followed by palpitation of the heart and a sense of oppression; was treated at times for some heart affection. At age of 9 œdema of the legs appeared with pain in the abdomen and back and increased rotundity of the abdomen. On examination there was considerable œdema of the face, lower extremities and trunk. The heart dulness was increased to right, but there were no murmurs; ascites was not recognized. The urine was free from albumin; there was dulness at bases of both lungs behind. Was improved during his stay in the hospital; five months later returned with moderate œdema of trunk and lower extremities, ascites and hydrothorax; the liver was enlarged with smooth surface; spleen at no time was palpable. He went about with a varying degree of ascites and œdema until readmission a year later; the ascites was then extreme and œdema very marked. Heart dulness increased to right; was attacked by erysipelas and an umbilical hernia developed. He was discharged somewhat improved and returned eighteen months later with œdema only slight, but ascites extreme:

aspirated. Two months and a half later a marked friction was felt over the liver. Patient remained fairly well only complaining of the ascites. The liver gradually became smaller. On subsequent aspirations the fluid removed was of a serous character, pale, opalescent, specific gravity 1005, and contained 3.5% of albumin. The liver gradually became markedly smaller and its edge thickened and rounded; the spleen was slightly enlarged. Osteomalacia developed and chronic bronchitis; the patient finally died of heart weakness after nine years illness.

Autopsy: Chronic inflammation of the serous membranes; "zuckerguss"-liver; chronic deforming perihepatitis; osteomalacia; adhesions of both lungs, bilateral hydrothorax; adhesions of gall-bladder to stomach and of spleen and stomach to diaphragm. The liver was covered with a white shining membrane 5 mm. thick; there was complete pericardial synechia. Intestines and kidneys normal; "zuckerguss"-spleen which was but little enlarged. The liver showed brown atrophy but no cirrhosis.

Case XII. (Schmalz & Weber.)

Patient a female, æt. 42. Her illness began acutely with signs of heart weakness and epistaxis and ran a course of about four years. During the exacerbation which resulted in her death, the liver was enlarged, reaching to a point one hand's breadth above the symphysis; its surface was not nodular. Ascites had been present for some time and the patient was tapped thirty-three times. A friction rub was heard over the base of the left lung behind, there was also dulness in the same region. A systolic murmur at apex of heart and later a pericardial rub. No history of alcoholism or syphilis.

Autopsy: Chronic inflammation of the upper part of the peritoneal sac; perihepatitis chronica fibrinosa; old appendicitis and perityphlitis; recent fibrinous pericarditis; left old adhesive pleurisy; moderate enlargement of the spleen; anæmia of the kidneys; fatty degeneration of heart. The liver was covered with a dense firm connective-tissue membrane and was of a shiny white appearance resembling porcelain; the liver parenchyma was compressed and there was no evidence of cirrhosis; the connective tissue deposit averaged .5 to .6 mm.

Case XIII. (U. Rose.)

Male, æt. 56. Admitted to the hospital on Aug. 20th, 1898. For three years previously had suffered from ascites and shortness of breath on exertion. The appetite was good and the bowels regular; in all other respects felt well. There was a history of alcoholism but no syphilis.

On admission the patient was somewhat anæmic and markedly icteric; the pulse was 66; the heart sounds were normal except that the aortic and pulmonary second sounds were accentuated at the base. The dulness of the heart, liver and spleen was masked by the lung-resonance; the lower border of the liver could be felt four fingers' breadths below the costal margin; the spleen was palpable. The abdomen was distended; the urine was free from sugar and albumin.

The temperature varied between 35.5°-36.6°C. On two occasions the patient vomited blood without preliminary distress. On Aug. 30th had a chill with temperature rising to 40°, gradually falling to 38.5°. The tongue was dry and coated ; pulse small and frequent ; patient somnolent. Numerous râles could be heard over bases of both lungs, but particularly on left side behind. Coma developed and death occurred on Sept. 1st.

Autopsy : Slight clouding of the pia mater ; heart dilated showing fatty degeneration and brown atrophy of the muscle ; pericardium was normal ; the aortic valves and aorta were slightly calcified. The pleural cavities were free from exudate ; the upper part of the right lung was covered with a smooth, white and shining membrane 2 mm. thick, resembling cartilage ; the rest of the pleura was normal without adhesions ; left pleura normal. Pneumonia of the left lower lobe was present.

The intestines were distended and there was slight acute peritonitis along the course of the ascending colon. The stomach was slightly adherent to the under surface of the liver. The posterior portion of the upper surface of the liver was adherent to the diaphragm by loose adhesions and the whole of the upper and the anterior half of the lower surface of the liver was covered with a hard, smooth, fibrous membrane like porcelain about 2 mm. thick ; on section the organ showed extreme typical cirrhosis. The spleen was adherent to the stomach and diaphragm and covered with a similar dense membrane ; both liver and spleen were much enlarged. The mucous membrane of the intestines was practically normal ; the sigmoid flexure was also covered with the characteristic membrane. Genito-urinary system normal.

IV. ANALYSIS OF CASES.

The fourteen cases here collected on analysis present the following points :—

AGE :

The earliest age at which the disease began was four (Riedel), and the oldest fifty-six and a half (Curschmann). Eight cases of the fourteen began after the fortieth year and five in the first five lustra.

SEX :

The proportion of males to females affected is equal.

PREVIOUS HISTORY.

In eleven there had been a previous attack of acute inflammatory disease. Thus in four (Hamboursin, Weiss, Curschmann, Schupfer) there had been acute hepatitis and perihepatitis ; in two (Pick and Rumpf) acute pericarditis ; in one (Vierordt) acute rheumatism ; in one (Weiss) typhoid fever ;

in one (Riedel) whooping-cough ; in one (Schupfer) malaria ; in one (Siegert) measles ; in one (Schmalz and Weber) perityphlitis. In three cases the history was too scanty to give any information upon this point.

DEVELOPMENT AND CLINICAL FEATURES.

With regard to the manner in which the disease originates and progresses the recorded cases show some variation. It is not always possible to determine with certainty the site of the original lesion, assuming for the moment that we are dealing with an inflammatory process of progressive character. Judging however from post mortem appearances and the opinions expressed by the various authors, a cardiac origin was certain in three (Rumpf, Pick, Siegert), and probable in three (Vierordt, Riedel, Schmalz and Weber. These were divided as follows :—pericarditis in five ; weak heart in one. A hepatic origin was suspected in four (Hamboursin, Weiss, Curschmann, Schupfer), and these were probably due to acute hepatitis and perihepatitis. One case (Nicholls) was most probably due to duodenal ulcer ; and in one case (Rose) the point of origin was not positively determined. The onset was acute in six ; insidious in five ; no note in three. Leaving out of account Hale White's cases in which the history is too scanty to afford any information on the point, the shortest period during which the disease lasted was two years (Weiss) and the longest sixteen (Rumpf) ; the average duration was six years.

MORBID ANATOMY.

Any or all of the serous membranes may be affected. The pericardium, the capsule of the liver, the upper portion of the peritoneum, and the pleuræ are the most frequent combination, being affected in nine instances, or rather less than three-fifths of the cases. The various membranes were affected as follows:—

Capsule of Liver	Capsule of Spleen	Pericardium	Rt. Pleura	Lt. Pleura	Instances
+	+	+	+	+	7
+	+	+	+	—	1
+	+	+	—	+	1
+	—	+	+	—	1
+	—	+	—	+	1
+	+	—	+	—	2
+	—	—	+?	+?	1

Heart: The condition of the heart is not mentioned in all the cases. Hypertrophy of the right side occurred in two instances; relative insufficiency of the tricuspid valve in one.

Lungs: When the lungs are not completely adherent they are often compressed from inflammatory effusion or hydrothorax.

Liver: The liver was at first enlarged but later diminished in size in five cases; it was found to be small in eight; in one case it is inferred to have been small; enlarged in one case; of normal size in two cases; and no note in two.

Spleen: The spleen was found enlarged in six instances; normal in size in one; diminished in two; no note in five.

Digestive tract: The digestive tract was normal in eight; no note in three; any disturbance of this tract was trifling in amount. "Disturbance of digestion" was noted in one case (Hamboursin); anorexia, constipation and diarrhœa in one (Curschmann); duodenal ulcer in one (Nicholls).

Kidneys: With regard to the kidneys the notes are incomplete; they are mentioned in seven cases. They were normal in three; granular in two; congested in one; and anæmic in one.

Ascites: This was a marked feature of the disease being present in every instance. In some cases the effusion into the peritoneal cavity was fibrinous or fibrinopurulent.

Anasarca was invariably present and was occasionally extreme.

The condition of the *Omentum* is not always noted, but it was frequently found deformed and rolled up into a fibrous mass.

Death usually occurred during an acute exacerbation or from some complication.

TABLE FOR DIFFERENTIAL DIAGNOSIS.

Special Features.	"Zuckergussleber."	Atrophic Cirrhosis of Liver.	Chronic Tubercular Peritonitis.	Carcinoma of Peritoneum.
AGE	Occurs about middle life or later.	Oftenest about middle age.	Commonest between ages of 20 and 40.	Occurs late in life.
SEX	Both sexes equally liable.	More frequent in males.	Predominates in females.	More frequent in females.
PREVIOUS HISTORY	Often a history of acute pericarditis or perihepatitis.	History of alcoholism, syphilis or digestive disturbances.	Often a chronic cough; diarrhœa, or genital tuberculosis.	In some cases a history of cancer of stomach or ovaries.
Alcoholism	No influence.	Frequently present.	Unimportant.	Unimportant.
Syphilis	No influence.	Occasionally present.	Unimportant.	Unimportant.
Heredity	No influence.	Unimportant.	May be family taint.	Unimportant.
INCIDENCE	Acute becoming chronic or insidious from the first.	Insidious.	Onset may be acute or insidious.	Insidious.
CHRONICITY	Cases last for years.	May last for years.	Prolonged	Fairly rapid course, with cachexia.
FEVER	Generally absent except during excerbation or some complication.	May be a febrile; when present is slight.	Usually slight, often absent.	Rarely absent; due to complications.
PAIN	Indefinite and trifling	Trifling.	Apt to be troublesome.	Variable.
DIGESTIVE DISTURBANCE	Trifling or none.	Constant; dyspepsia, nausea, vomiting, gastric hemorrhage, melæna.	Fairly common	Often marked.
ASCITES	Constant and extreme.	Constant.	Never extreme; may be absent; may be hemorrhagic.	Moderate grade; may be hemorrhagic or pseudochylous.
ANASARCA	Constant but slight.	Relatively slight.	Trifling.	Slight.
JAUNDICE	Absent in pure cases	Occurs in 27% of cases.	May occur exceptionally.	Common, when liver is involved.
LIVER	Not cirrhotic; at first enlarged, then small; smooth.	Cirrhotic; at first enlarged, then small and warty.	Often enlarged.	May be enlarged, with nodules.
SPLEEN	Gradual enlargement.	Gradual enlargement.	Nothing special.	Nothing special.
OMENTUM	Thickened and contracted.	Normal.	Often matted up.	Often matted up.

V. THE SYMPTOMS AND COURSE OF CHRONIC HYALINE PERIHEPATITIS ("ZUCKERGUSSLEBER").

Most cases give a history of indefinite disturbance from the first such as anorexia, shortness of breath, and epigastric pain, and do not come under observation until ascites is well marked.

In some instances, however, the disease begins acutely with fever, rigors, and pain in the epigastrium; the liver region is tender and swollen. The condition may then become comparatively quiescent with only occasional outbreaks of acute symptoms. Or again it may come on with fever, pain in the chest, palpitation of the heart and dyspnœa, these symptoms eventually subsiding and giving place to indefinite sensations of pressure and fulness in the epigastrium together with a gradually increasing sense of bodily disability. In whatever way it may develop, however, the disease is essentially chronic, lasting for years. The patients may not be seriously incapacitated for work during long periods, but the condition proves singularly refractory to treatment and relapses are frequent; in fact periods of latency alternating with acute exacerbations are characteristic.

In all forms ascites is the main feature and is the only constant and striking physical sign. The disease presents various forms differing in the order of development of the symptoms. Two types at least may be recognized. In the first—**Primary Perihepatitis**—the leading features are ascites, which tends to return after paracentesis, and a liver at first enlarged and later small, smooth, and hard, with rounded edges. As the disease spreads to the right pleura and pericardium corresponding signs make their appearance; pleuritic exudation with eventual adhesions and pericardial synechiæ. As a consequence of this we find the usual signs of adhesive pericarditis, namely an indefinite apical impulse, possibly systolic retraction of the chest wall, pulsus paradoxus and later signs of cardiac dilatation. Dilatation of the veins of the neck, chest and arms, may be noted. A transient although more usually a prolonged enlargement of the liver may occur when the affection of the Glisson's capsule is but slightly developed.

The spleen is usually enlarged except in those persons well up in years where there is evidence of a generalized

senile atrophy of the organs. Anasarca may be absent or only appear in the terminal stages. Tapping of the abdomen becomes necessary and has to be resorted to at intervals becoming gradually shorter; the patients emaciate, hydrops becomes general, and death finally results.

In the second variety—**Primary Pericarditis**—the earliest signs are referable to the presence of an adherent pericardium or indurative mediastino-pericarditis. The process spreads to the right pleura and finally to the capsule of the liver. Only after a prolonged period do the classical symptoms of "Zuckergussleber" make their appearance. The liver is enlarged, smooth with sharp edges and there is moderate œdema of the lower extremities. In some cases there may be evidence of pleural effusion or the formation of pleural adhesions. The acute symptoms may subside leaving only indefinite traces; the fever disappears, the œdema passes off or is only present during the day, and the patients recover sufficiently to go about their daily work with a fair amount of comfort. As time goes on the liver diminishes in size, the anasarca lessens and ascites becomes the most prominent feature. Eventually paracentesis becomes necessary and has to be repeated at intervals varying from a week to two years.

As affecting the clinical course the character of the pericardial lesion is of importance, for when there is calcareous infiltration of the adherent membranes it has been found that the course of the disease is shorter.

In either form, unless complicated with cirrhosis of the liver, icterus is never found. On account of the abdominal distension the enlarged organs may not be readily palpated and may only be detected after free tapping. It is usually to be made out that as the liver becomes smaller in size the spleen becomes enlarged. Digestive disturbances are, when present, only trivial; they consist of anorexia, constipation or diarrhœa, and a sense of fulness about the stomach. The severer disturbances of the alimentary tract, such as hemorrhage from the œsophagus stomach and bowels, do not occur. The amount of urine is diminished, in adults amounting only to 600 cc. per diem or less; its specific gravity varies between 1015 and 1035 and varies with the degree of ascites. Albuminuria is only found exceptionally and is in most cases chiefly attributable to the extreme passive congestion. The cases

last from two to sixteen years, and usually end from some acute complication such as lobar pneumonia, acute peritonitis, either simple, suppurative or tuberculous.

VI. MORBID ANATOMY OF CHRONIC HYALINE PERIHEPATITIS.

The feature common to all the cases here noted and which gives the disease its name is the formation upon the various serosæ of a smooth and glistening pearly white membrane of cartilaginous consistency. All the authorities comment on the remarkable appearance of this material and by many it is compared to porcelain or the icing upon a cake (Zuckerguss). The layer varies in thickness from .5 to 5-10 mm. or more ; the membrane can be readily stripped off from the subjacent organs in a continuous sheet. The process affects by preference the upper part of the peritoneum, the bases of the pleural sacs, and the pericardium. While it is true that more than one serous sac is involved in the process, they do not all necessarily present the "icing" appearance ; various grades of the affection are met with in different regions. The pleuræ and the pericardium are most usually deformed by firm adhesions of the common fibrous type, and even where the hyaline membrane is typically developed it is not infrequently combined with adherent fibrous bands anchoring the affected organ to the adjacent structures. Sometimes one of the serous sacs or some part of it is attacked by an acute exudative inflammation ; fibrinous or fibrino-purulent exudates are not rare. Thus acute fibrinous pericarditis was noted by Schmalz and Weber ; acute pleurisy by Weiss, Curschmann, and Hale White ; and acute peritonitis by Curschmann, Vierordt, and Rose.

The post-mortem appearances are striking. The body is much emaciated, although this is usually somewhat masked by the general anasarca ; ascites is usually extreme ; the superficial veins of the abdomen are dilated and if indurative mediastino-pericarditis be present, those of the neck, thorax and upper extremities. As the result of the ascites the lower thoracic region is widened ; lineæ albicantes are present and even umbilical hernia has been observed. The ascitic fluid is of a pale straw color with fibrin flakes and is rich in albumin. The great omentum is hard to recognize, being usually

transformed into a fibrous cord or an irregular contracted mass. It may contain hydropic cysts, as may also the fibrous material elsewhere. In severe cases the mesentery is thickened, pearly white and greatly shortened, so that the intestines lie bunched up along the vertebral column. Localized acute peritonitis either simple or tuberculous has been met with. Loose fibrous adhesions between the coils of the intestines are frequent; the mesenteric glands are enlarged, reddened and succulent.

The "zuckerguss" membrane more or less completely involves the liver which may indeed be cut off from the general abdominal cavity; the upper portion of the abdominal cavity is lined by the same material. The liver is usually found small and much altered in shape; the edges are rounded and the anterior border is often rolled up over the upper surface; when the investing membrane is removed the rolled-up edge can be replaced in its normal position. The gall-bladder is often involved in a dense inflammatory mass and may be so contracted as to be with difficulty recognizable. Adhesions between the liver and diaphragm are common. The surface of the liver is smooth or slightly uneven. On section it shows brown atrophy and passive congestion. Interstitial fibrous hyperplasia does not generally occur; at most in a few instances there is slight thickening of the septa passing in from the Glisson's capsule; this is however quite superficial. Microscopically there is brown atrophy and fatty degeneration of the liver cells with great congestion of the capillaries; in certain parts compensatory hypertrophy of the acini may be observed.

It should be remarked here that the vast majority of cases of "Zuckergussleber" are unaccompanied by hepatic cirrhosis. Exceptionally we find a slight grade of fibrous induration in close relationship to the thickened capsule or associated with passive congestion of the organ, but this is practically negligible in amount. In only one case (Rose) was a true mixed cirrhosis present and both anatomical and clinical features were anomalous. The liver, spleen and sigmoid flexure were covered with the "icing" membrane, the pericardium was free and only the upper part of the right lung was involved while the base was normal. Microscopically the liver was markedly cirrhotic. Rose could suggest no explana-

tion for his case, but did not think that cirrhosis was the cause since the fibrous bands within the liver did not appear to be derived from the capsule. In other words, the cirrhosis was primary rather than secondary to the Glissonitis. In another place the explanation of this case will be discussed and the relationship of chronic perihepatitis to cirrhosis, but it is so far clear that we have to sub-divide our chronic perihepatitis cases into two groups: First, most typical and most numerous, those *without* cirrhosis, giving rise to the special symptom-complex to which Curschmann first drew attention; second, and very rare, those *with* cirrhosis.

This latter group differs from the first in presenting the features of hepatic cirrhosis—jaundice and gastro-intestinal symptoms—in addition to the morbid changes of "Zucker-gussleber."

With regard to the pleuræ it is to be noted that the right is, as a rule, more seriously involved than the left. A "zuckerguss" condition of the right pleura is frequent; when this occurs on the left side it is associated with a "zuckerguss" spleen. Very characteristic and suggestive is the localization of the pleuritis to the under surface of the right lung, the centrum tendineum of the diaphragm and the right side of the pericardium which are usually matted together into a dense fibrous mass, sometimes containing areas of calcification. When pleural adhesions are marked the lungs are atrophied, in part collapsed, and on section show chronic œdema with possibly slight induration. Chronic bronchitis with bronchiectasis has been observed and also calcification of the bronchial cartilages.

Chronic pericarditis is, as a rule, present with partial or total synechia. More rarely an acute fibrinous pericarditis is found, or the pericardium may be normal. When partial synechia is present it occurs on the right side, and even in total adhesion it is on this side that the condition is most extreme. The heart is often small, but may show the effects of the adhesive pericarditis, namely dilatation and relative insufficiency of the valves. Sometimes the right ventricle shows hypertrophy in those cases where the pleural sacs are obliterated. The muscle may show brown atrophy.

The spleen is often enlarged, generally "zuckerguss" and deformed and may be adherent to the diaphragm; in very advanced cases it may be atrophic.

The kidneys usually show no special abnormality, but in a few cases interstitial fibrosis has been observed.

The digestive tract shows but little except that the stomach and colon may be adherent to the neighbouring parts; duodenal ulcer has been reported in one case. Icterus is never present unless the case is complicated by cirrhosis of the liver or obstructive cholelithiasis.

As complications which hasten the fatal termination, acute pneumonia, acute pericarditis, pleurisy, peritonitis and osteomalacia, may be mentioned.

VII. TREATMENT OF ZUCKERGUSSLEBER.

No specific medication has been as yet devised for the condition; most cases come under observation when the disease is well established and irremediable. The chief indication is to meet the symptoms as they arise, alleviate pain and relieve the ascites by paracentesis when this becomes troublesome. In one case lapatotomy was followed by cessation of symptoms for two years. Siegert recommends pure caffeine in doses of 0.1 to 0.15 grms. six to ten times daily; other diuretics such as digitalis, diuretin and urea may be tried. The patients should be kept under the best hygienic conditions while at their homes and should only undertake light work. Acute complications must be treated on their merits as they arise.

VIII. PROGNOSIS.

The prognosis should be guarded. The disease is essentially chronic and may last for many years without dangerous menace to life; still the condition is steadily progressive and invariably ends fatally. The cases complicated with severe adhesion of the pericardium generally run a more rapid course than do those originating in the peritoneum. Special danger to life exists from acute complications such as pneumonia and septic peritonitis.

IX. ETIOLOGY AND PATHOGENESIS.

An enquiry into the nature of multiple progressive hyaloserositis (Zuckergussleber) becomes quite complicated from the fact that it may be approached from various points

of view, and that the disease itself presents anatomically several differing forms. It will perhaps be most convenient to study the "zuckerguss" condition as it occurs in the recorded cases, and having drawn our conclusions from this, then to pass on to the consideration of the relationship between this condition and inflammation of the serous membranes in general.

First then with regard to "Zuckergussleber."

It has already been stated that somewhat divergent views have been expressed as to the true nature of this condition, and it would perhaps be well at this point to discuss the theories advanced somewhat more in detail in the light of the facts already gleaned. The majority of the authorities, including Rumpf, Siegert, Schmalz and Weber, who have most carefully considered the subject, are agreed that it is an inflammatory affection and that the ascitic fluid is to be regarded as an inflammatory exudate. They believe that the process may start in any one of the serous sacs and spread to the rest one after the other. Pick on the contrary (loc. cit.) thinks that a heart lesion is the primary trouble, and that the thickening of the peritoneum is secondary to the circulatory disturbance induced thereby, or, in other words, that the thickening of the liver capsule is the reaction to a long-continued portal obstruction. His views are summarized in his paper as follows:

1. There is an affection—*pericarditic pseudo-cirrhosis of the liver*—simulating the symptom-complex of a mixed form of hepatic cirrhosis (with enlarged liver, extreme ascites, but without jaundice), the result of a circulatory disturbance produced by a latent pericarditis which leads to fibrous proliferation, portal obstruction, and the most extreme ascites.

2. This is met with, by preference, in young individuals but also in later life.

3. In making the differential diagnosis the following points are important: The history of a previous attack of pericarditis with œdema of the limbs in the absence of the etiological factors for cirrhosis of the liver. Careful examination of the heart will give most important information.

Pick explains the development of the "Zuckergussleber" in terms of this theory as is made plain by the fact that he classes the cases of Curschmann and Rumpf under the

category of "pericarditic pseudo-cirrhosis." We are therefore practically reduced to the discussion of two alternatives. Is chronic proliferative perihepatitis a primarily inflammatory affection and the ascitic fluid thus an inflammatory exudation? Or is it merely due to portal congestion, the ascites caused by this reacting upon the peritoneum so as to produce fibrous hyperplasia?

Pick, while bringing forward several interesting cases and a certain amount of evidence in favor of his views, in our opinion somewhat weakens his argument by admitting that in addition to portal stasis there may be catarrh of the endothelial cells of the peritoneum in consequence of the ascites and a slight infection due to the repeated paracentesis performed in most of these cases. In the paper referred to Pick reports three cases of his own, only one of which, that cited above, bears anatomically any resemblance to "Zuckergussleber." His cases are all similar in that there were pericardial adhesions, portal congestion, and periportal proliferation of fibrous tissue, together with general chronic peritonitis and hydrops. Slight jaundice was present in two cases but typical "zuckerguss" organs were found in none although in one the peritoneum liver and spleen were involved in thick fibrous tissue.

There can be no doubt that Pick's first observation is correct, that cases do occur in which a chronic proliferative pericarditis, and for that matter a valvular lesion, leads to portal congestion and ascites without marked general anasarca, thus simulating a primary cirrhosis of the liver. Strümpell referred to this condition in 1883. Such cases, however, seem to be rare. In my post-mortem experience at the Royal Victoria Hospital I can recall no instance out of seventy examinations of chronic heart affections, embracing valvular myocardial or pericardial disease, in which the liver was warty to gross appearance and in only five was there microscopically a condition of intralobular cirrhosis. So far as clinical symptoms went these five cases did not differ in any particular from other cases of heart disease with passive congestion.

When, however, Pick comes to explain cases of "Zuckergussleber" such as those of Curschmann and Rumpf on his theory, his conclusions are certainly not borne out by the facts.

In the production of chronic perihepatitis, pericardial disease can only act in two ways—1st, pericardial inflammation, originally acute but becoming subchronic and progressive, may extend to the adjacent serous sacs, notably the right pleura and peritoneum, and thus lead to a new formation of fibrous tissue about the liver; or, secondly, the heart weakness by producing stasis within the liver and hepatic cirrhosis with its consequent portal obstruction may lead to ascites which in its turn may cause irritation of the serous membrane and fibrous proliferation.

Let us consider the latter alternative first, namely, is the presence of portal congestion necessary to explain the ascites, the enlargement of the liver and the hyperplastic perihepatitis in these cases? Several cases may be cited to show the contrary. Hübler, Sr.[16] for instance, records the following case of "Zuckergussleber":—

A woman, æt. 56, was seized with loss of appetite, emaciation, anæmia, palpitation of the heart, attacks of an asthmatic type, and a febrile biliary colic. The heart and lungs were normal; the liver of normal size; neither the liver nor spleen was palpable. A year later she suffered again from biliary colic, and still later from ascites. Aspiration was performed a number of times and the liver gradually diminished in size; the spleen was not enlarged. The patient had several attacks of biliary colic with jaundice and died ten years from the onset of the illness. *Autopsy:* The peritoneal covering of the liver was greatly thickened and was of a curious porcelain-like whiteness; the liver was small and adherent to the diaphragm and appeared to be compressed; the gall-bladder contained a few cholesterin calculi. Moderate jaundice was present and there were local purulent peritonitis, recent verucose endocarditis, and congestive enlargement of the spleen; the peritoneum was thickened also over the lowest part of the anterior abdominal wall.

Microscopically the liver cells showed fatty infiltration but no cirrhosis.

Here then there were no pericardial adhesions, no portal congestion, and no cirrhosis of the liver, although ascites and hyperplastic perihepatitis were present in a marked degree.

In the case of Schmalz and Weber, above mentioned, there were again no evidences of portal congestion or cirrhosis of the liver. Pericardial synechiæ were absent, the acute pericarditis which was present being a late event, while ascites and "Zuckergussleber" were present. The authors regarded their case as due to an infection of the liver from

the region of the old appendicitis, made possible probably by the preliminary condition of cardiac weakness.

In Rose's case also pericardial adhesions were absent and the cirrhosis of the liver which was present was not regarded by the writer as a special cause, the fibrous bands in the organ not being connected with the capsule.

In this connection may be cited the experience of W. P. Herringham (St. Bartholomew's Hosp. Rep. 1893, p. 1) In an analysis of a large number of cases of chronic peritonitis he states his opinion that none of his cases supported the view that the condition could be produced by long continued ascites due to cirrhosis of the liver.

Further, with the single exception of Pick's case, the autopsy findings do not indicate portal obstruction, and even here the condition is probably to be explained on another hypothesis. The portal vein is rarely if ever found dilated. In one case (Vierordt) it is noted that the hepatic vein was enormously distended, due probably to the fact that the right side of the heart was firmly adherent to the pericardium with calcareous plaques, while both pleuræ were obliterated. In this instance the liver was nutmeg but not cirrhotic.

As a matter of fact, periportal cirrhosis, a condition that frequently gives rise to portal obstruction, is excessively rare in these cases, nor indeed would one expect to find proliferation of fibrous tissue in the portal sheaths as a consequence of stasis from a cardiac lesion. In all cases of cardiac cirrhosis that I have examined the fibrous proliferation was confined to the regions of the centrilobular veins and periportal fibrosis was absent or quite minimal in amount. It is true that periportal fibrosis has occasionly been observed in cardiac livers but it never leads to obliteration of the capillaries. On the contrary they are dilated. In the only case of our series associated with marked cirrhosis, that of Rose, the pericardium was normal and the fibrous overgrowth in the liver could not be attributed to stasis. Therefore, whatever may be the causes of portal obstruction in cases such as Pick's, it cannot be due to the pressure of contracting fibrous bands upon the portal radicles. Even were such present the process, one would think, would act equally well upon the bile ducts and thus produce jaundice, a condition which as we have seen is decidedly rare.

The histories further show that in chronic perihepatitis where the disease begins with adherent pericardium and passive congestion of the liver, anasarca rather than ascites is the first symptom, contrary to what we should find were Pick's view the correct one. They would also indicate that in those forms where ascites is the first and prominent symptom, it is not necessarily due to stasis in the portal system or in the inferior vena cava. Were portal congestion a prime factor we should expect to get signs of stasis in the gastro-intestinal tract—gastritis, dyspepsia, vomiting of blood, melæna, œsophageal varices—yet these are decidedly rare, in fact in pure cases do not occur. Finally, there is but little evidence to show that a simple ascites from transudation is capable alone of setting up an irritation of the serous membranes severe enough to produce proliferative fibrosis, although Rokitansky (Path. Anat. 3 Aufl., III., s. 138, 1861.) and Ziegler (Path. Anat. 8 Aufl., II., s. 564, 1895.), state that local thickenings of the peritoneum may arise from this cause.

As everyone knows, peritoneal disturbance is by no means an infrequent event in the course of diseases that are competent to produce ascites, such as cirrhosis of the liver, organic heart disease, and chronic nephritis. In this class of cases dense fibrous adhesions between the viscera and the neighbouring structures are quite common, pointing to some extinct inflammatory process. Less often there is evidence of acute exudation, either sero-fibrinous or fibrino-purulent. Comb nations of exudative inflammation with proliferative hyperplasia are rarer still. With the view of eliciting any facts that might throw light upon the etiology of the formative inflammations of serous membranes, I have made a careful search through the post-mortem material at the Royal Victoria Hospital. Cases of old adhesions or hyperplastic formations affecting the serous cavities were looked for, but in making the classification only those cases were noted in which the capsules of the liver or spleen, either together or with involvement of some of the other serous membranes, were affected. By this selection some approximation to the condition present in our recorded cases was arrived at. In 467 post-mortems the combination referred to was met with thirty-five times, a proportion of 7.5%; in only two instances was the "zuckerguss" condition found. These post-mortems

were further divided into two groups, the first including cases of atrophic cirrhosis of the liver, cases of chronic nephritis, and of cardiac insufficiency (myodegeneration, adherent pericardium, valvular disease, general hypertrophy and dilatation, etc.); the second including all other diseases. There were fifty-eight cases in the first group, and the special combination of lesions mentioned (perihepatitis and perisplenitis) was present in eight, or 13.8%. In the second group, 409 in all, the lesions were found in twenty-seven, or 6.6%; of these, ten, or rather more than one-third, were due to local tuberculosis. These cases were all simple and uncomplicated, and in so far as it is safe to draw conclusions from such a limited experience, we are probably warranted in stating that multiple adhesions affecting the serous membranes referred to are present in a relatively large proportion of all autopsies and that the complication is twice as frequent in cases of atrophic cirrhosis of the liver, chronic nephritis and cardiac insufficiency, as in all other forms of disease combined. A further enquiry into the possible effect of ascites as a causative factor showed, however, that this element is of little importance, there being only a slight increase in the number of cases where ascites is present. Considering, now how common a condition ascites is, it is likely that if it had any special tendency to excite a chronic hyperplastic change in the peritoneum this would be a relatively frequent discovery post mortem, whereas it is rare. Again, were ascites a prime cause of the proliferative process one would expect that the lesions in these cases would be most marked in those regions where the ascitic fluid is most apt to collect, namely, the pelvis and the flanks. On the contrary it is the upper part of the peritoneum, the capsules of the liver and spleen, and the surface of the stomach that are chiefly and characteristically affected. I consequently believe that Pick's view is based not only on incorrect observation but also upon incautious generalization. Eisenmenger[22] in a critical study of Pick's cases has come to similar conclusions.

We have to consider now the other hypothesis, that the primary factor is an inflammatory process.

In the first place the vast majority of cases give a history of a previous attack of acute inflammatory disease, usually of an infective nature, and more or less definitely connected with

the onset of the perihepatitis. Thus in four there was an acute hepatitis and perihepatitis; in three and possibly in four, acute pericarditis, etiological factors that, judging from the clinical course, might correctly be regarded as direct exciting causes. Further, in all cases where the history is complete, there is evidence of a recurring inflammation of one or more serosæ resulting in a chronic proliferation of fibrous tissue on the affected membranes. The pleuræ, the pericardium, and the upper part of the peritoneal membrane, involving the liver and spleen, are the parts usually affected; and even in cases that develop insidiously there is ample evidence of an inflammatory process being at work since from time to time there are relapses with acute inflammatory symptoms affecting one or more of the serous membranes and followed by an aggravation of the condition. Cases such as those of Curschmann, which began with an acute febrile hepatitis, and of Hübler where there were repeated attacks of biliary colic and cholecystitis previous to the onset of the ascites, afford very strong evidence in favor of the inflammatory theory.

It has already been pointed out that the ascitic fluid in most cases cannot be explained on the theory of obstructive transudation from the great vessels. Many facts are in favor of it being an inflammatory exudate although accurate observations upon this point are lacking. Curschmann pointed out that the albuminous content of the fluid was relatively high, namely 3.2%; in Rumpf's case it is noted that the specific gravity of the fluid was 1009 and that on standing threads of fibrin were deposited. Siegert states also that in his case the specific gravity was 1005 and the albumin amounted to 3.5%. In my own case, although an accurate estimation was not made, the fluid was undoubtedly rich in albumin since, on standing, spontaneous clotting was quickly induced. Although in these cases the specific gravity is relatively low for an inflammatory exudate, the amount of albumin is about twice that in simple transudation fluids and corresponds accurately enough with what has been found in inflammatory effusions. The following table taken from Halliburton may be compared in this connection :—

Pleural Fluid	Sp. Gr.	Percentage		Quantity of	
		Total proteid	Fibrin	Serum globulin	Serum albumin
Acute Pleurisy, case 1 . . .	1023	5.123	0.016	3.002	2.114
" " 2 . . .	1020	3.4371	0.0171	1.2406	1.1895
" " 3 . . .	1020	5.2018	0.1088	1.76	3.330
Hydrothorax . . . . . (Average of three cases)	1014	1.7748	0.0086	0.6137	1.1557

It might be remarked here that the amount of albumin noted in the above table is extremely high as compared with the amounts obtained by the most recent methods. The discrepancy would probably be accounted for by imperfections in the method of estimating the albumin in relation to the total nitrogen, but inasmuch as the table gives the relative proportion of albumin in inflammatory fluids as compared with mere transudations, it is sufficiently accurate to illustrate our point.

A strong argument in favor of the inflammatory nature of the disease is derived from a histological study of the "zuckerguss" membrane. From the microscopical appearances of this material in my own case it is evident that we have to do with a chronic inflammation of progressive type. The membrane was composed of successive layers of fibrous tissue varying in type from the common fibroblast to the well-formed connective-tissue cell. In certain places this tissue had undergone a peculiar change whereby the fibres had become swollen, semi-translucent, and almost structureless (hyaline), corresponding, no doubt, to the cartilaginous appearance of the membrane when fresh. In addition, in the deeper layers could be seen perivascular leucocytic infiltration, with the formation of new capillaries and with numerous "mastzellen." Such a stucture could not be anything but inflammatory. It is worthy of note also that the condition is not due to a proliferation of the connective-tissue of the capsule of the various organs, but is rather the organization of an exudate upon the surface of the serous membranes. This is readily seen by a glance at Fig. 1, taken from the liver where the wrinkled Glisson's

capsule of practically normal appearance is clearly demarcated from the investing membrane. The great extent of the membrane is separated from the capsule by flattened spaces lined with endothelium evidently derived by a proliferation of the original endothelial covering of the serous membrane. Here and there, however, the fibrous investment is anchored to the liver capsule by delicate strands of connective tissue. Young connective tissue cells make their way from the capsule into the membrane so that organization is clearly going on from below. This loose attachment explains why it is that the membrane so readily peels off from the subjacent organs.

FIG. 1.

Winckel obj. No. 5, without eye-piece.

Shews well the Glisson's capsule thrown into folds with the deposit of hyaline fibrous tissue upon the surface.

Exactly the same process is going on in the case of the lungs where the lungs themselves and the visceral pleura were practically free from inflammatory change.

The peculiar lamination of the material is well seen in Fig. 2, and is apparently due to some modification of the fibrillar substance between the strands of which the nuclei lie.

From the appearance of the fibres, hyaline degeneration was suggested, colloid and amyloid degeneration being excluded by the application of the usual tests. The translucent structureless appearance described is in all respects similar to the hyaline change known to take place occasionally in fibrinous exudates and the material in question gave the usual microchemical reactions for hyaline. With Van Gieson's stain it took the uniform bright red color of the fuschin, suggesting in accordance with the view of P. Ernst (Virch. Arch. CXXX., S. 377, 1892) a derivative of connective tissue, although it is true some doubt has recently been expressed

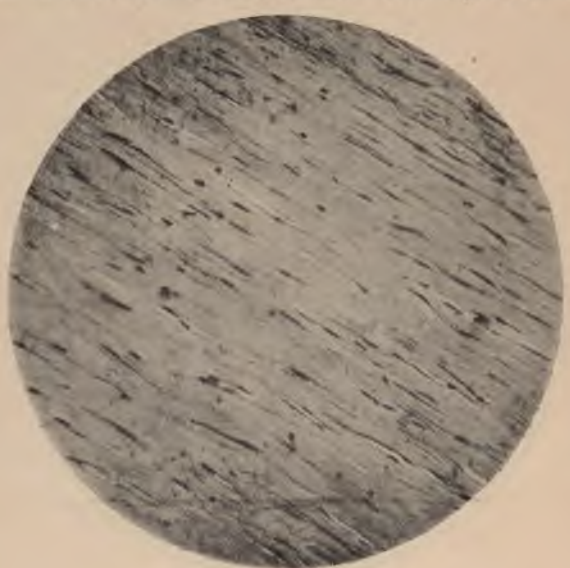

FIG. II.

Leitz obj. No. 7, without eye-piece.

The section shews the hyaline degeneration of the connective-tissue deposit with the striking lamination. Blood-vessels are absent.

(Lubarsch) as to the value of his observations. Owing to the absence of the specific microchemical reaction to the Gram-Weigert stain, it was concluded with some probability that fibrin was not present, and that if the condition originated in a fibrinous inflammation, the fibrin had all been dissolved or converted into organized material, or at least had undergone some modification.

Detailed information as to the structural appearance of the "zuckerguss" material in other cases is lacking, but I have in addition examined the material from a case that I obtained in Vienna and in this observed the same perivascular extravasation of leucocytes with fibrosis and hyaline degeneration, indicating, as in my own case, an inflammatory process. Fig 3 illustrates very well the condition in this case.

It is perhaps somewhat difficult to say in my case in what

FIG. III.

Reichert obj. No. 3. Camera lucida drawing. Peritoneal membrane in "zuckerguss" condition showing perivascular leucocytosis and hyaline degeneration of the superficial fibrous tissue.

part the inflammatory process originated. The presence of calcareous plates at the base of the left lung and in the perisplenic adhesions suggest the possibility of it having started in the left pleura. It does not, however, necessarily

follow that where calcareous material is deposited this is the oldest seat of the process. A careful examination in the neighborhood of the duodenum showed that the ulcer there found presented a characteristically chronic appearance. It had perforated all the coats of the intestine and its base was formed by a dense mass of fibrous inflammatory material which had formed at that spot. The position of the ulcer on the upper surface of the duodenum rendered the site favorable for the development of a localized inflammatory reaction. And considering that we know that in cases of ulceration of the stomach or bowels, where a fatal result from septic peritonitis does not immediately ensue, fibroid adhesions may form in the locality and so prevent immediately serious consequences, it seems more probable that we have to look for the starting point of the chronic inflammatory condition in this local ulcerative process.

In regard to the structure and origin of the "zuckerguss" membrane it is instructive to compare certain appearances found post mortem that must be familiar to every morbid anatomist. It is a matter of common observation in the autopsy room to see, particularly on the spleen, but sometimes on the diaphragm or pleuræ, pearly opalescent nodules of cartilaginous consistency, varying in size from a pinhead to a pea, or even larger. In certain cases the spleen is sprinkled with large drops resembling paraffin, or is covered with a definite cuirass. The appearance is very similar though in a somewhat extremer degree, to the pearly thickening of the pleura occasionally seen in the neighbourhood of anthracotic tubercles. These deposits are seen wherever there is chronic irritation, quite independently of the presence of ascites. I have examined a number of such plaques microscopically both in the splenic capsule and in anthracotic areas, and they all show a laminated formation of fibrous tissue together with hyaline degeneration—in all respects comparable to the membrane in the "zuckerguss" condition. There is the same avascular stratified layer with swelling of the fibrillæ and relatively little leucocytic infiltration. One case of which I have notes (Post mortem records of the Royal Victoria Hospital, No. 28, 1901) is particularly instructive, as it shows the early stage in the development of the "zuckerguss" condition as the result of an inflammatory process.

Male, æt 80, who gave a history of indefinite disturbance in the neighbourhood of the epigastrium ; pain after eating ; occasional vomiting ; tenderness on pressure and progressive emaciation. When admitted there was distention of the abdomen in two horizontal zones divided at the level of the umbilicus ; there were tenderness and resistance in the epigastrium, and to a less extent over the ileo-cæcal region ; the liver and spleen were not palpable. Free fluid in the abdominal cavity was made out.

At the autopsy the abdominal cavity was found to be covered in by a peculiar thin homogenous semi-translucent membrane of glassy appearance through which the intestines could be imperfectly seen. This material could be torn off in sheets and was practically avascular. Between the coils of the intestines were numerous plastic and some firmer adhesions, together with pockets of fibrino-purulent fluid. The spleen was completely tied up in firm adhesions, and the great omentum was converted into a fibrous cord. Upon the under surface of the diaphragm next the liver were a series of pearly nodules of hyaline translucent appearance, which microscopically presented the characteristic appearances found in the "zuckerguss" membrane, including the lamination and the hyaline degeneration. The gall-bladder contained calculi and was much shrunken with greatly thickened walls.

In this case no doubt the exciting cause was cholelithiasis with cholecystitis and pericholecystitis (cf. Hübler's case) resulting in a chronic proliferative serositis. The gall-bladder was the centre of a mass of dense fibrous adhesions passing on to the formation in certain places of a curiously glassy and avascular membrane, clearly the precursor of the "zuckerguss" condition that had already begun to be developed upon the diaphragm.

As still further elucidating this point and presenting even a more striking resemblance to the "icing" condition, I may cite the following case also occurring under my observation

CASE. (15/01. R.V.H.).

Patient was a male, æt. 80, admitted to the Royal Victoria Hospital on Nov. 30th, 1900, who died on March 5th, 1901.

Personal History : Meagre :—For a period of his life had been a great drinker of gin, more abstemious of late years ; had been subject for many years to bronchitis, more especially during the winter ; one attack of pleurisy 50 years previously. On the evening of Nov. 27th was exposed to the weather and was taken ill suddenly with pain in the side, cough and cold feet, but without chill.

Condition on Admission : Somewhat cyanosed :—Pulse, 100 ; temperature $98\frac{4}{5}$; respirations 36.

Respiratory System : Dyspnœa :—Ineffectual cough with blood-tinged sputum and severe pain in the right infra-mammary region. Chest was barrel-shaped and there was an area of dulness over the

apex of the right upper lobe, over the apex of the lower lobe posteriorly and also over the upper part of the middle lobe ; in this region the breathing was blowing and there were bronchophony and increased fremitus. Numerous crackling rales and coarse, moist and dry rales were heard. Sputum showed the diplococcus lanceolatus but no tubercle bacilli.

Vascular System : Pulse fairly regular, sometimes intermittent ; arteries thickened ; no cardiac murmurs noted ; number of leucocytes, 15,500.

Urine : Acid, Sp. gr. 1014, a moderate amount of albumin with numerous granular and fatty casts.

Progress of Case : Dulness at the base of the right lung gradually increased ; the pulse became very weak so that the patient was given repeated inhalations of oxygen. The right lung only very gradually cleared up. On Feb. 13th the patient developed erysipelas of the face.

Diagnosis : Acute Lobar Pneumonia, undergoing very slow resolution or Tuberculous Infiltration ; Chronic Bronchitis and Emphysema ; Arterio-sclerosis ; Myocarditis ; Chronic Interstitial Nephritis ; Cirrhosis of the Liver ; Erysipelas.

The Post Mortem was performed by Professor J. G. Adami thirteen hours after death. The body was that of an old man, very much shrunken, with the usual signs of death.

Thorax : There were very dense adhesions over the whole upper part of the right lung requiring the use of the knife.

Right Lung, 680 grms., the pleura was greatly thickened, measuring about 2 mm. and was converted into a white almost cartilaginous looking membrane. Upon cutting into the lung the whole of the upper lobe and a portion of the middle was very firm, fibroid and of a greyish color. The bronchioles were slightly dilated and milky pus oozed from them. The bronchi throughout were dilated and thin-walled with evidence of chronic bronchitis. A few fine whitish dots were scattered throughout the fibroid portions of the lung.

Left Lung : Emphysematous and bronchiectatic.

Heart : The muscle showed no signs of myocarditis ; the coronaries were tortuous but without atheroma ; muscle of the left ventricle slightly hypertrophied.

Stomach : Normal.

Intestines : Normal.

Spleen, 90 grms., was contracted by a marked fibrous thickening of its capsule more especially upon the anterior and lower aspects. This thickening in the lower portion posteriorly reached 12 mm. and in the antero-lateral aspect, 1.5 to 2 mm. This material had a dense hyaline and ivory-white appearance resembling closely the thickened condition in the right pleura. The substance of the organ was shrunken and fibroid.

Pancreas, slightly fibroid. Both *Kidneys* showed evidence of slight chronic interstitial nephritis.

Liver : 1050 grms. The organ small ; occasional fibrous streaks noted in capsule. On section friable and of a slightly brown tinge.

No signs of generalized chronic peritonitis.

Microscopical sections were made through various parts of the lung

and thickened pleura for the purpose of determining the exact nature of the thickening and of the fibroid pneumonia.

Lung: The thickened pleura was found to consist of narrow bands of fairly well-formed connective tissue which formed a dense interlacing meshwork. In parts this structure was very loose giving the impression of a myxomatous degeneration and in this numerous bipolar and stellate cells were present. In other places the bands were thick, structureless aud translucent, apparently hyaline. The pleura was not specially vascular and contained here and there numbers of mononuclear cells of polymorphous variety, the exact nature of which was not very clear. The other specimens showed that numerous small capillaries were being developed and round about some of the larger vessels were considerable accumulations of leucocytes pointing clearly to the condition being an inflammatory process.

Coming to the lung substance itself a very striking picture was produced, the lung being converted into a dense fibroid mass the alveolar spaces in many instances being obliterated or reduced to very small proportions, while others again were greatly dilated and bounded by rounded mononuclear cells with clear protoplasm. Some again were more or less filled with catarrhal exudate so that the whole structure at first sight suggested a scirrhous carcinoma. Here and there too were nodular areas, somewhat broken down in the centre, made up of inflammatory leucocytes together with many cells of a more epitheloid appearance. These suggested tubercles or small areas of necrosis and numerous sections were made to determine if tubercle bacilli were present. The bacillus in question was not found and inasmuch as certain of the nodules were bounded by coal pigment they were finally regarded as being of the nature of anthracotic tubercles or similar local areas of necrosis.

Sections stained by the Gram-Weigert method revealed a few diplococci with the morphology of the diplococcus pneumoniae and some large irregularly staining bacilli with rounded ends.

Liver: Microscopical section showed slight atrophy of the lobules with a moderate amount of fatty infiltration at the periphery. There was a slight increase in the nuclei in the portal sheaths but no evidence of cirrhosis.

Spleen: The spleen pulp was normal in appearance except for a slight atrophy of the substance; the capsule was uniformly enveloped in a thick layer of fibrous tissue arranged in parallel laminae having a hyaline translucent appearance and containing very few nuclei. This material was uniformly dense, absolutely avascular bearing a general resemblance to corneal structure. There was no evidence of leucocytic infiltration or fibrinous deposit. Sections stained by the Gram-Weigert method for bacteria failed to reveal any. The condition here was that of a hyaline proliferative inflammation of the splenic capsule.

Anatomical Diagnosis: Right-sided Chronic Indurative Pneumonia; Chronic Proliferative Pleurisy; Chronic Hyaline Perisplenitis; Bronchitis and Emphysema; Bronchiectasis; Senile Granular Nephritis; Senile Atrophy of Organs.

This case differs from Case XIV. in many important particulars. The presence of a "zuckerguss" spleen, with a

somewhat similar thickening of the right pleura, brings it into the category of multiple progressive hyaloserositis. No clinical symptoms pointing to the affection were found further than the evidence of delayed resolution in the right lung. This is accounted for by the special distribution of the lesions. The liver was unaffected by the process and there was no generalized chronic peritonitis; the pericardium was also normal. The usual causes, therefore, for ascites and anasarca were absent.

Although the typical symptom-complex was absent, the character of the membrane upon the spleen and the right pleura proves that the process at work in the two cases is almost identical and that, pathogenetically speaking, the two cases may correctly be compared. An inflammatory origin for the lesion was certain, considering the onset with acute pneumonia followed by the signs of delayed resolution and thickened pleura. A direct etiological relationship between inflammation and the production of a hyaline fibrous overgrowth is thus made clear. Probably the advanced age of the patient and his greatly weakened condition had much to do with the comparatively trifling extent of the proliferative process, death occurring before the disease had fully time to develop itself. Further we may gather that chronic proliferative hyaloserositis may present wide variations as to its localization as well as noteworthy differences in the symptoms produced, but to this point I shall return.

As an additional evidence of the inflammatory origin it may be pointed out that there is a general correspondence both in age-incidence and in development, between the "zuckerguss" condition and acute and subacute inflammation of the serous membranes. The Italians particularly have drawn attention to the acute forms under the term "Polyorromenitis" and have laid some stress on a particular group of symptoms that point to this condition. Indeed, having regard mainly to etiology and progression in these cases, they are inclined to use the term "Polyorromenitis"—which of course refers to a multiple affection—to instances where there is inflammation of but one serous membrane. According to Picchini[9], acute polyorromenitis is rather more frequent in males and occurs usually between the ages of sixteen and thirty. Taking our recorded cases, with the exception of

those where the history is incomplete, we find that males are slightly more frequently affected than are females and that the average at which the patients first come under observation is thirty-two. Now considering that the time of onset in the acute cases can be decided accurately while in the "Zuckerguss" condition it can only be inferred in a rough sort of way (the disease is so indolent that patients go about for years with but trifling disability) and further, allowing sufficient time for the full development of the symptoms, we see that the figures correspond fairly accurately. Due regard also must be had to the fact that we are dealing with very few cases on which to base our conclusions and that some allowance is to be made for individual variations which may be great. If we consider however those cases where there is a fairly clear history of pericarditis, hepatitis or perihepatitis, which was the case in nine instances, we find the average age-incidence to be twenty-seven, which conforms even more closely to Picchini's figures.

But in addition to the general correspondence in age-incidence between the acute and the chronic affections of the serous membranes, we find that there is a more striking resemblance in that in both forms more than one serous membrane is apt to be involved. The disease may become progressive attacking one membrane after another according to a fairly definite rule. It is a fact of common observation that acute inflammation of one serous membrane readily spreads to a neighboring one and inasmuch as all the serous cavities form an intercommunicating lymph system, it is by the lymph-channels that the process most readily spreads. A brief reference to the anatomical distribution of the lymphatic channels will throw a flood of light upon the development of these cases. In the capsule of the liver upon the upper surface of the right lobe are three sets of lymphatics, one emptying into the lymph-glands about the vena cava, the second into those at the hilus, and the third penetrating the liver with the septa of the Glisson's capsule. The channels upon the surface of the left lobe discharge into the glands around the lower end of the œsophagus; certain of the superficial lymphatics of both lobes, however, unite and run in the suspensory ligament to the hilus and the superior cava. More important, however, they form by the union of several branches

a large trunk that penetrates the diaphragm and again dividing empties into the glands of the anterior mediastinum ; a certain number of the lymphatic channels from the pleural surface and the diaphragm likewise discharge here. The anterior mediastinal glands are also connected with the internal mammary glands which on the right side together with the lymphatics of the pericardium, the diaphragm and the mediastinum, empty into the right broncho-mediastinal trunk into which the right pleuro-pulmonary lymphatics also flow.

This distribution explains why it is that the lower and posterior parts of the liver capsule are relatively little affected in cases of inflammation, since the lymphatics by which the process spreads run to the hilus, the vena cava inferior, and the Glisson's capsule into the liver, in the last instance to reach again the hilus by the branches which accompany the vena porta. It also explains why it is that any cirrhosis of the liver which is present is apt to be confined to the immediate neighbourhood of the capsule.

Many clinical and experimental facts also illustrate this mechanism. Particularly often is the right pleura involved in cases of peritonitis, for, as many gynæcologists have pointed out (Waldeyer, Schrœder, Spiegelberg, Lawson Tait, Häckel, Spencer Wells), a pleuritic exudate, usually on the right side, is apt to complicate pelvic and puerperal peritonitis. In many instances the pericardium becomes affected as well. Durham (On the Mechanism of Reaction to Peritoneal Infection, Jour. Path. and Bact., Lond., 1897, p. 338), among many others, has shewn that in experimental peritonitis the anterior mediastinal glands are the first to become involved in the dissemination of the infective agents, and this readily explains the involvement of the pericardium and pleura in cases of peritoneal inflammation. Further, the study of post-mortem material, as I have often had opportunity to note, shews how often when the liver or the spleen is adherent to the diaphragm, the base of the corresponding lung is affected as well forming an additional proof that inflammation of the serous membranes occurs in the main by direct lymphogenic distribution.

Taylor[21] gives the course of involvement of the various serous membranes in "acute polyorromenitis" according to the order of frequency as follows:

1. Peritoneum involved first with extension to the pleuræ, usually the right.

2. The pleuræ, then the peritoneum.

3. The pleura of one side and then the opposite.

4. The inflammation may affect one pleura, then the peritoneum and finally the other pleura.

He also points out the important fact that in these cases pericarditis and pleurisy are generally combined, especially when a left-sided pleurisy is present.

Now if we compare what happens in the case of the "zuckerguss" condition we see that there is a striking parallel. In the vast majority of the chronic hyperplastic cases it is the Glisson's capsule, the pericardium and the pleuræ that are involved: The right pleura especially is liable to be attacked. In all cases (11) except those of Hale White, Pick, and Schmalz and Weber, it was involved in the inflammatory process, usually in the form of a chronic adhesive pleuritis; it is usually thickened and may be affected only at the base or *in toto*, or again may be adherent to the diaphragm and pericardium. If now we consider the order in which the various serous membranes are affected in the chronic disease, we see a strong resemblance between the acute and chronic conditions. Judging, as far as may be, from the clinical histories we find that out of the fourteen cases the origin was peritoneal in nine. Usually it started about the liver and extended secondarily to the pleura and peritoneum; in five, pericarditis and pleuritis were the first lesions, followed by the peritoneal manifestations.

The case of Schmalz and Weber is particularly instructive as it shows how step by step an inflammatory process can creep from membrane to membrane in these "zuckerguss" cases. Moreover, since there were no pericardial adhesions and no cirrhosis of the liver the case is an uncomplicated one and the question of passive congestion as a causative factor cannot enter therein. In this case there was evidence of an old appendicitis and perityphlitis with some heart weakness followed by ascites. In the patient's last illness the liver was enlarged and a friction rub was heard over the base of the left lung with evidence of some effusion; later still a pericardial rub was noted. There were found in accordance with these symptoms "Zuckergussleber," chronic adhesive pleurisy on the left side, and an acute fibrinous pericarditis.

In the "zuckerguss" condition also we note that the force of the hyperplastic process is expended, so to speak, upon the mid-point of the body, the parts most deeply involved being the upper surfaces of the liver and spleen and the bases of the lungs, exactly as in those cases of fibrous adhesions already referred to which were due to a pre-existing but completed inflammatory process. The farther from this centre the process extends the less marked it becomes. Such a peculiar distribution of the lesions can hardly be accounted for except upon the view that the exciting agent or agents are disseminated by the lymph. On account of the anatomical structure of the body there is a natural tendency for the transmission of fluids towards the centre—in other words, the neighbourhood of the diaphragm ; and further, the respiratory movements tend to promote the flow of the peritoneal fluid in an ascending direction towards the diaphragm whence it is sucked into the lymphatic channels thus helping to disseminate any infective or toxic agents which may be present through the circulation thus produced. It is to be remarked, however, that another factor comes into play besides the peculiarity of the lymphatic distribution and that is, that, owing to the movements of the diaphragm in respiration, the structures in the immediate vicinity are always in a state of physiological unrest and thus the serosæ of these parts are, particularly when inflamed, subjected to constant irritation.

Clinical experience teaches us how infrequent it is for the several serous membranes to be involved simultaneously in an acute inflammatory process. Even in the case of pleurisy and pericarditis, which are so frequently found together, careful observation of the condition from the beginning of the illness nearly always shows that the inflammation starts in one sac some days before it invades the other. So far as we know no instance has been met with in which there was a generalized hæmatogenic development of the lesions. A progressive lesion is the rule, and the histories show that the same thing holds good in the case of chronic hyaloserositis. Here three modes of dissemination of the process are possible:—

1, from the peritoneum ; 2, from the pericardium, and 3, from the pleuræ.

As a type of the peritoneal incidence, (the commonest form) Curschmann's case may be cited. In this, the sudden

onset with rigor, pain in the epigastrium, swelling and tenderness in the right hypochondriac region, point strongly to the primary lesion being an acute hepatitis and perihepatitis. These signs were followed by anorexia, a sense of fulness and pressure in the abdomen; ascites came on and the case ended with symptoms of a fresh acute peritonitis and a left-sided pleurisy. The various steps leading to the production of chronic adhesive mediastino-pericarditis and right adhesive pleurisy would seem to be fairly clear.

Next in frequency is the pericardial onset, and Siegert's case is instructive in this connection. In his patient, who had at one time been treated for his heart, an attack of measles resulted in palpitation of the heart with some oppression. After five years œdema of legs appeared followed by enlargement of the abdomen. Although ascites was not discovered on his first sojourn in the hospital there was evidence of free effusion into both pleural cavities. Five months later ascites had developed and nearly two years later still a friction was detected over the liver. Evidently the pericardial inflammation extended to the abdominal cavity through the intervention of the pleuræ.

No example of a pleuritic origin for the disease is on record with the exception of my second case. This indicates clearly, apart however from perihepatitis, that a chronic pleuritis may give rise to a multiserositis. Observations are not wanting, however, to show that chronic pleurisy may eventually extend to the liver capsule. O. Rosenbach [12] writes as follows:—

"A further unfavorable complication of obliterating pleuritis is thickening and contraction of the liver-capsule and obliterating pericarditis which we sometimes see developing as a direct sequel of pleuritis, sometimes at a more or less prolonged period after its disappearance, so that it remains a question whether the pleuritis is the cause of the affection of the other serous membranes or whether a kind of fibrous diathesis does not exist."

After impartially considering the evidence just adduced, we must, I think, conclude that in the "zuckerguss" condition we are dealing with a primarily inflammatory disease, albeit one of a peculiarly latent yet progressive character.

But, while this is the case, it should be pointed out that

subsidiary factors play a not unimportant part; in fact a number of conditions act and react so as to aggravate the primary trouble. It might, for instance, be suspected from the low specific gravity of the ascitic fluid in some of these cases that it is not entirely of the nature of an inflammatory exudation, and this is probably the case. It has previously been pointed out that in addition to the continuous hyaline membrane existing upon the surface of the various viscera, dense adhesions and deposits of a more definitely fibrous and scar-like character are common, and it has been found that these are frequently present in the neighborhood of the gastro-hepatic omentum. An indurative mediastino-pericarditis is also common and it is further the rule that the induration is most extreme at the right side of the pericardium near the base. Pressure upon the portal vein and upon the inferior vena cava in such cases can thus be readily brought about, so that obstructive transudation may be combined with exudation and this no doubt explains in part the fact that ascites is such a prominent feature in the clinical picture. While then, portal stasis does in some cases occur, it is *extra* hepatic, and, contrary to Pick's idea, an effect rather than a cause of the "zuckerguss" condition.

Again, the formation of a dense membrane over such a large extent of serous surface must of necessity hamper the absorption of fluids from the peritoneum and tend to keep them penned up in the cavity; moreover the contraction and thickening of the mesentery point to indurative changes at work in the deeper tissues whereby a condition of lymphatic obstruction and interstitial fibrosis is brought about somewhat analogous to what occurs in elephantiasis. In two ways then absorption and resolution of inflammatory products are interfered with.

It is probable, that the grave disturbances of nutrition thus produced, together with the excessive intra-abdominal pressure explain the condensation and hyaline degeneration that is such a characteristic feature of the newly-formed membrane which renders it particularly resistant and non-absorbable. The fact that hyaline degeneration is so common in inflammatory exudates and the desquamated cells from glandular organs, indeed, in avascular tissues generally, suggests a nutritional vitium as a cause. We have, in

fact, a process where connective tissue production is in excess of tissue destruction and where absorption and resolution of the inflammatory products are rendered particularly difficult. This proliferative overgrowth, further, owing to the interaction of these factors, seems to acquire a tendency to self-propagation. Once well started it must progress so that the suggestion of Rosenbach that a sort of "fibrous diathesis" exists, is perhaps not very far fetched. Indeed, others have suggested the same thing. Pye Smith recognized a general liability for fibrous tissues generally to undergo inflammation without limitation to a particular organ. It is probably too much to say that the new connective-tissue cells possess the power of independent proliferation, but certainly a condition very much akin to diffuse fibromatosis is the result.

To account for the peculiar stratified appearance of the membrane is not, perhaps, difficult. My own observations on inflammatory exudates and fibrous proliferation upon serous surfaces show that there is a general tendency for the fibrillæ of the developing connective tissue to arrange themselves more or less concentrically with the capsule of the organ involved. Possibly the same mechanism that produces the lamination in thrombosis is, in part, at work here; or the alteration of active inflammation with periods of comparative rest with deposition of the more solid constituents of the exudation, together with variations in the local nutrition, all may play a part. Variations in the intra-abdominal pressure which might theoretically be of import are apparently of no significance for the same condition of lamination is seen in cases where ascites is absent, *e.g.*, upon the spleen.

The condition of the liver demands a word or two. The histories show that in most instances the liver is enlarged in the earlier stages of the disease, but at autopsy is found contracted. This has been explained on the assumption that the thickened capsule gradually contracts about the organ and thus produces a pressure atrophy. This supposed pressure upon the liver has also been adduced as a cause for portal stasis. These views are, in my opinion, entirely incorrect. The preliminary enlargement of the liver is due, as a reference to the recorded cases clearly shows, to one of two causes —either there is an acute inflammatory hyperæmia and infiltration, or there is a condition of vascular obstruction within

the organ. The latter state is found in a large number of the recorded instances to be due to pericardial adhesion or to pressure upon the inferior cava just as it passes through the diaphragm by inflammatory material. As proof of this may be adduced the fact that a nutmeg condition of the liver is frequently present, as was the case in my own first example. Now, the liver is but rarely completely surrounded by the fibrous envelope so that total centripetal pressure is, as a rule, an impossibility. Were the diminution in size of the organ due to the pressure exerted by a contracting fibrous investment, we would expect that in these cases the spleen, which is generally involved in an identical process, would also be small ; on the contrary, the rule is for it to be enlarged. Again, pressure of this kind exerted upon the liver would almost certainly compress the finer bile-capillaries and so produce jaundice, but this is unknown in uncomplicated cases. Much more likely therefore is it that the diminution in the size of the liver is due to the atrophy and fatty degeneration produced by the backward pressure in the inferior cava and the radicles of the hepatic vein, together with grave disturbances of nutrition the result of deficient oxygenation of blood and interference with the free distribution of lymph within the organ.

With regard to the spleen the rule appears to be that in the early stages of the disease it is small or but with difficulty palpable and towards the end it becomes enlarged. This enlargement is coincident with the development of marked venous stasis throughout the body and is probably to be explained as the result of passive congestion of the organ. I have only had opportunity to examine one spleen in chronic perihepatitis and passive congestion was in this case a marked feature. Were the enlargement due to inflammatory hyperplasia we would expect that the increase in size would be observed in the early stages of the disease rather than the later. The proliferation of the epithelioid plates in the pulp described by recent writers as occurring in the acute infective diseases was not present in my example. The enlargement here at least was not due to splenitis.

The condition of the great omentum is of some clinical importance. It is usually involved markedly in the indurative process, being found either as a fibrous cord running across

the upper part of the abdominal cavity or forming a nodular mass near the median line. A little reflection will show why this should so readily occur. The great omentum is formed of a double layer of the peritoneal membrane. It is thus composed largely of connective tissue and fat with certain layers of endothelial cells. What strikes one is its great vascularity, quite in excess of the needs of its structure. This suggests that it plays an important part in the transudation and absorption of fluids. Considerable evidence has been in fact adduced to show that it has an important function in the removal of ascitic and inflammatory fluids from the abdominal cavity, so that it might be compared to a subsidiary heart. Durham, in his article on "Peritoneal Inflammation," (loc. cit.) shows that in the early stages of experimental peritonitis the leucocytes are chiefly gathered upon the surface of the great omentum so that the fluid in other portions of the abdominal cavity is relatively free from cells. We may thus fairly conclude that in peritoneal inflammations the great omentum is first and chiefly affected and hence would likely be specially involved in any chronic indurative process.

Two more clinical features require explanation. In a reference to the cases of perihepatitis recorded it will be seen that clinically they fall into two main groups ; 1st those that begin with anasarca, and 2nd those beginning with ascites. In the first class there are transient attacks of œdema which eventually become permanent and this is eventually followed by ascites. It will be seen that invariably these are the cases that begin with adhesive pericarditis and right-sided pleurisy ; compression of the inferior cava is the first effect with its resulting general anasarca. Only when the process extends to the peritoneum and the liver capsule does ascites make its appearance. The cases beginning with ascites are those where the process begins in the peritoneum ; œdema is a late symptom here and only occurs when the sclerosing process has extended to the right pleura or pericardium or both.

With regard to the ultimate nature of the inflammatory process, precise information is lacking. It is usual to ascribe inflammation of the serous membranes to bacterial activity, to the action of toxic agents or to trauma. The more we study these processes and the wider our knowledge becomes,

the more we realize that it is impossible to disassociate the various factors from the action of micro-organisms. Trauma can hardly occur without infection either from the external world or from the viscera contained within the organism, and, while it may be admitted that bacteria in the course of their growth elaborate toxic substances so that every infective ascites is in part chemical, yet the chemical theory as advanced by Tavel and Lanz in the case of acute peritonitis cannot be considered as resting on any firm basis of fact. Such chemical serositis may perhaps exist as an experimental process, but almost certainly never occurs under the usual conditions of disease. It is undoubtedly the tendency now-a-days to ascribe all the acute inflammations of the serous membranes, or at least the clinical forms, to infection. This being the case it is most natural to look for the cause of the inflammation in the "zuckerguss" condition in the action of micro-organisms.

Complete bacteriological studies do not appear to have been made in the cases hitherto recorded, so that our information is but scanty, and our conclusions must therefore be drawn largely from inference. In my first case there were grounds for believing that the process was due to micro-organisms, owing to the distribution of the germs in the superficial layers of the "zuckerguss" material while they were inconspicuous in the deeper portions. At all events, the condition could not be due to a post mortem growth of bacteria, since the body was examined within one hour of death and was quite warm. The only microbe isolated was the staphylococcus albus which could not be regarded as specific since, owing to its distribution in the blood vessels, it was evidently merely the cause of a terminal infection. While then some doubt must exist as to the specific cause in my case, still on other grounds the evidence in favor of the bacterial origin is fairly strong. We know, for instance, that in acute multiserositis, the pneumococcus, B. coli, staphylococcus, streptococcus and B. tuberculosis have frequently been demonstrated. Now, many cases of hyaloserositis begin acutely with symptoms pointing to inflammation of one or other of the serous membranes, a condition which appears to be in direct causal relationship to the "zuckerguss" condition; what more natural then than to conclude that bacteria are at work in the chronic cases also? The history of a

previous attack of acute infective disease, a sudden chill with fever, the progressive involvement of one serous sac after another, first with exudation and then with adhesion, together with repeated relapses, suggest very strongly a bacterial origin. In hyaloserositis, there are evidences of a progressive lesion, and a progressive lesion must of necessity have a constantly acting cause.

Repeated observations show that those cases of acute multiserositis which are due to pyogenic organisms, almost invariably end fatally. It is therefore, to a germ of relatively low virulence that we have to look for the cause of proliferative inflammation. The pneumococcus, B. coli, B. typhi and B. tuberculosis are the most likely offenders. In my second case we have an instance where the patient after resisting with some difficulty an attack of pneumonia, nevertheless lived sufficiently long to allow a proliferative inflammation of pneumococcus origin to develop. The power of the B. coli and B. tuberculosis to produce subacute and chronic inflammation has long been recognized.

The relation of cholelithiasis and cholecystitis to "Zuckergussleber" has already been referred to, and the researches of Naunyn, Dufort, Gilbert and Girode, and others show that the former condition is frequently brought about by the B. coli and B. typhi, and as Chiari, Flexner and others have shown the B. typhi may live for months in the body, especially in the bile passages, retaining a certain amount of virulence. This is suggestive in connection with the case of Weiss which began with signs pointing to hepatitis and perihepatitis subsequent to an attack of typhoid fever. The frequency of pericarditis in these cases suggests also the agency of the microbe of inflammatory rheumatism, whatever that may be, in many instances. Vierordt's case might possibly come into this category since there was a rheumatic history. A brief reference should be here made to the suggestion of Pick that repeated tappings may lead to an infection of the peritoneal cavity. This cannot be a necessary factor inasmuch as the condition developes long before tapping becomes called for and, as a matter of fact, does develop quite independently of any operative interference of this sort. My own case, for instance, had never been tapped.

We must next consider the statements frequently seen in text-books, that alcohol, gout and syphilis are potent causes. In our fifteen cases an alcoholic history was noted five times, and in Hale White's cases of perihepatitis (deducting the two here recorded), four times in twenty cases. The connection, therefore, does not seem to be a very intimate one, in fact it is difficult to understand how chronic alcoholism could act in these cases except as a remote contributory condition. The most important lesions induced by alcohol are arterio-sclerosis, fatty infiltration and cirrhosis of the liver, and nephritis, and none of these form a striking feature in the general picture of hyaloserositis.

Again, it is the tendency in certain quarters to attribute every obscure condition to gout, but this etiological factor appears to be less important than alcoholism; it was only present in four of Hale White's twenty-two cases. The same difficulty in accounting for its possible action is met with as in the case of alcoholism.

With syphilis the case is somewhat different. In none of our recorded cases was the existence of syphilis noted; in only one is it stated that the patient's father had had syphilis. Lancereaux, (Trans. New Syd. Soc., Vol. I. p. 326) believes however in the existence of a chronic adhesive and membranous peritonitis due to syphilis occurring in young children and occasionally in adults. A primary gummatous syphilis of the serous membrane is, however, yet unknown. A syphilitic serositis can only be explained on the assumption of an extension of the inflammatory process from some viscus presenting syphilitic lesions. Herringham (loc. cit.) records two cases of chronic peritonitis with perihepatitis which probably started from a gummatous liver, so that the possibility of a syphilitic origin for chronic serositis must be admitted. Still it must be said that in the light of our present information no case of multiple hyaloserositis is as yet to be attributed correctly to syphilis. As is well known endarteritis is a common lesion in syphilis, alcoholism and gout, and it has been suggested that poverty of nutrition in the serous membranes due to this cause might be provocative of a fibrous proliferation. In my own cases I have been unable to satisfy myself that any such process was at work.

The influence of heredity is absolutely nil.

Believing then, as I think we must, that the "zuckerguss" condition is due primarily to inflammation, let us now consider whether it is possible to account for Pick's case on this principle rather than the one he holds, which, as we have seen, is at variance with the great mass of evidence, the most that can be admitted being that portal congestion and ascites in some rare instances may be contributory but even then remote factors.

It is possible that circulatory disturbances within the liver such as are brought about by passive congestion with alteration in the blood-content of the organ may initiate the process. Everyone is aware how often an inflammatory process supervenes in an organ or tissue which is chronically congested. In varicose veins, for instance, where weakened and distended veins lead to lowered nutrition of the tissues, inflammation is a frequent event. Again bronchitis and pneumonia are common in persons suffering with valvular disease of the heart.

Now, in adherent pericardium and obstructive disorders generally of the circulation, when the liver is subject to varying degrees of internal tension, together with œdema and lowered vitality of its tissue, inflammation may, theoretically at all events, be readily induced. We have evidence of this, to a certain extent, in the frequent discovery post mortem of fibrous adhesions between the liver and spleen and the diaphragm in cardiac cases. No doubt a number of factors are contributory. The ascites, while certainly not a necessary condition, may assist by inducing hydropic and catarrhal changes in the lining cells of the serosa, thus increasing irritation and promoting adhesion. So far as my studies go, passive congestion is the most potent single factor in the production of chronic local peritonitis of this type. Taking for example the spleen in the post mortem cases already referred to, perisplenitis as evidenced by thickening of the capsule or fibrous adhesions was met with sixty-four times. Forty-seven of these presented fibrous bands between the organ and the diaphragm. Of these ten were apparently due to congestion, eight to obsolescent pleurisy. Seventeen spleens presented fibrous or hyaline plaques, histologically identical with the "zuckerguss" material, upon the capsule without adhesion to the parietes. Six were probably due to congestion and two to obsolescent left-sided pleurisy.

Still when we come to the condition of "Zuckergussleber" the matter is very different for here we have a progressive lesion and in view of all the facts I am forced to conclude that passive congestion and the so-called cardiac cirrhosis have nothing to do directly or indirectly with hyaline perihepatitis. So far as I can learn acute perihepatitis and peritonitis which might form a starting point for a chronic lesion do not occur in uncomplicated cases of obstructive cardiac disease, or at least the clinical authorities make no mention of such an occurrence, and while fibrous bands connecting the liver and diaphragm are not infrequent in such cases a "zuckerguss" condition of any extent is never met with. The fibrosis in passive congestion of the liver is invariably centrilobular in type and never leads to a warty condition of the organ and it is difficult to see how the proliferation of fibrous tissue could extend to the capsule in such cases. The process is essentially a replacement secondary to degeneration of the parenchyma rather than a progressive inflammation. It is far more probable that we are dealing in Pick's as in our other cases with a creeping inflammation extending by means of the lymphatics whereby the surface of the liver and the peritoneum become involved secondarily from the pericardium and the pleura, for we have already had ample evidence of the possibility of such an occurrance. If we study the clinical aspects of Pick's case we find that it is entirely in accord with this view, for there is a history of preliminary pericarditis followed one year after by acute pleurisy, and two years later by the development of ascites.

MULTIPLE HYALOSEROSITIS WITHOUT PERIHEPATITIS.

Finally I would like to draw special attention to the fact that chronic multiple hyaloserositis is not invariably associated with perihepatitis. My second case above referred to in detail where an unresolved pneumonia lead to hyperplastic pleuritis and "zuckerguss" spleen is a case in point.

Packard [20] also has recently recorded a case which proves this.

Male, æt. 86; history of alcoholism. When seen was comatose, abdomen greatly distended with fluid and the area of liver dulness much diminished; the urine was bloody containing a large amount of albumin with casts. *Autopsy*: Slight anasarca; great ascites; peri-

cardium normal ; slight sclerosis of mitral and aortic valves as well as of aorta ; congestion and œdema of lung ; calcareous areas of consolidation at apices. On the visceral layer of the pleura were many pearly white nodules the size of pin heads, of cartilaginous consistence, mostly sessile but some having swollen pedicles. There were also numerous little wart-like growths from the pleura of a deep purplish color, apparently the remains of broken down adhesions. The stomach and duodenum were much congested ; spleen was somewhat enlarged ; its capsule was everywhere thickened and almost covered with plaques of cartilaginous hardness varying in color from yellowish white to buff ; around the lower extremity was a large flat, smooth plaque occupying the end of the organ while over the rest of the surface the plaques were smaller and darker, usually discrete but in some places confluent. Thickness of the large plaque was one-fifth of an inch. Liver was typically hobnailed and contracted and the gall bladder contained stones ; kidneys, granular.

In both cases hyaline perisplenitis is the chief feature with a similar more or less extensive involvement of the pleuræ. The capsule of the liver escapes. The lesions on the pleuræ may be of two kinds, as in Packard's case where multiple, flat and polypoid hyaline plaques were present, or, localized cuirass-like overgrowths as in my own case. In both the anatomical condition differs widely from the perihepatic type. The usual lymphatic distribution whereby the proliferative process is concentrated in the upper part of the peritoneal cavity and the base of the lungs and pericardium is here wanting. The explanation of Packard's case will be attempted in a subsequent chapter when dealing with the relationship of cirrhosis to perihepatitis. In my own case, however, the lesion in the right pleura was clearly inflammatory being secondary to the unresolved pneumonia. It is not, perhaps, easy to give a satisfactory explanation of the perisplenitis in this form of the disease. It is possible, however, that in the first case we are dealing with an extension of an inflammation of the spleen itself to the capsule, for a splenitis of moderate grade is a common accompaniment of acute pneumonia as of most infective diseases, and in examining other cases in which a "zuckerguss" deposit was present upon the spleen I have satisfied myself that there was an inflammatory process at work in the pulp leading to inflammation and thickening of the capsule. In such cases the distribution of the infective agent from the primary focus is most probably hæmatogenic. The fact that it was only the upper part of the right pleura that was affected

while the base was free at all events precludes the possibility of direct extension from the pleura to the peritoneum.

It is worthy of note that in neither case was chronic peritonitis present, nor was the liver-capsule involved, and it is mainly in this particular, anatomically speaking, that they differ from the "icing-liver" type. Clinically the differences are still greater for there is no special train of symptoms referable to the condition. In fact it is only possible to diagnose such cases in the autopsy room.

The ascites in Packard's case can, of course, be readily explained in view of the atrophic cirrhosis present and in the other the absence of ascites is undoubtedly due to the local character of the inflammation and the absence of any sclerosing process about the heart and great vessels.

Such cases, however, prove that we have to recognize a type of disease etiologically and pathogenetically the same as chronic perihepatitis yet differing from it in the absence of the usual clinical symptoms, and in the fact that there is a multiple sporadic type of lesion rather than a diffuse continuous one. It is nevertheless characterized by the same fibrous overgrowth with hyaline change, so that we must conclude *that chronic perihepatitis (Zuckergussleber) while the only clinically important form is nevertheless but one variety of a general process (multiple progressive hyaloserositis).* Two main types must be recognized; first, that in which the liver-capsule is affected (perihepatitis), and second, that in which it escapes. Indeed it is only when we have marked involvement of the liver capsule in the hyperplastic process with a more or less wide-spread proliferative peritonitis that we can have the symptom-complex of Curschmann.

X. CIRRHOSIS OF THE LIVER AND PERIHEPATITIS.

It has been pointed out in the foregoing remarks that the vast majority of the recorded cases of multiple progressive hyaloserositis are to be regarded mainly from the point of view of chronic perihepatitis, and give rise to a train of manifestations referable in part to the affection of the liver and in part to the chronic peritonitis that is such a constant accompaniment of the disease. Instances, however, are met with that, pathogenetically speaking, must be placed in the same

category, and yet anatomically and clinically they present a different picture. Such an aberration from the type is seen in Rose's case where there was the unusual combination of a multiple "zuckerguss" condition with a true mixed cirrhosis of the liver. Here, in addition to the usual features of ascites, enlarged liver and dyspnœa, the patient was moderately icteric and had vomited blood. The two symptoms of icterus and hæmatemesis sharply define this from the other cases, but the difference extends to the morbid appearances as well, for the "icing" membrane was sporadic in distribution, being developed upon the liver, spleen and sigmoid flexure, together with the upper portion of the right lung; contrary to the rule the bases of the pleuræ and pericardium were unaffected.

Packard's case of atrophic cirrhosis of the liver with "icing" spleen and hyaline plaques upon the pleuræ is a still wider deviation from the type.

These cases bring up the question of the relationship, if any, that cirrhosis of the liver bears to chronic perihepatitis and peritonitis and more remotely to the multiple affection of the serous membranes.

We have as yet but few data upon which to form an opinion and the exact connection is still obscure. It has long been recognized that very similar clinical symptoms may be produced by chronic perihepatitis and by cirrhosis of the liver. Our recorded cases clearly prove that cirrhosis of the liver is by no means a frequent accompaniment of hyaline perihepatitis; only exceptionally the two conditions may be combined. When the combination does occur three possible methods of development suggest themselves; 1st, either a primary cirrhosis of the liver may lead by extension to the thickening of the capsule; 2nd, bands of fibrous tissue may pass from the thickened capsule into the substance of the liver, analogous to the form of induration of the lung sometimes met with in chronic pleurisy; and 3rd, the two affections may be due to different causes and may exist independently.

Atrophic cirrhosis of the liver is a fairly common condition and yet I can recall no case where at autopsy the liver capsule was found to be "zuckerguss"; at most there is a trifling patchy thickening of the capsule or a few loose velamentous adhesions to the diaphragm. In only three of our

cases (Hamboursin, Pick, Rose) was there any evidence of intrahepatic fibrosis, and in no case did this take the form of atrophic periportal cirrhosis. On closer examination Hamboursin's case, as that of Pick, shows that the hepatic fibrosis was a centrilobular condition due to passive congestion, and had nothing to do directly with the initiation of the perihepatic lesion. In Hamboursin's patient the heart was normal in the earlier stages of the disease, only after some two years did cyanosis set in with hypertrophy of the heart. Consequently the stasis in the liver and the fibrosis must have been a late complication and not the cause of the perihepatitis.

So far as our present knowledge goes we may conclude that periportal cirrhosis does not tend to produce perihepatitis by direct extension of the proliferative process to the capsule. Only in the case of syphilitic gumma of the liver does there seem to be any tendency for this to occur. It is perhaps somewhat different with regard to acute inflammation of the liver substance; the cases of Curschman and Schupfer point strongly to a preliminary acute hepatitis so that it seems fairly certain that acute hepatitis may result in an acute and ultimately chronic perihepatitis without however leaving any lasting trace upon the liver parenchyma.

A microscopic study of the livers in "zuckerguss" cases shows almost invariably that if cirrhosis be present it is minimal in amount, strictly confined to the outer portion of organ and in intimate relationship with the capsule. Conversely most pathologists are agreed that perihepatitis may spread to the liver and produce a special form of cirrhosis (Glissonian). Commonly the process is most marked at the hilus and extends by radiating bands into the liver substance. This variety also leads to deformity and diminution in size of the organ and the surface is usually smooth.

Rose's case, as the ascites, the enlargement of the liver and the jaundice show, is an example of mixed biliary and periportal or so-called diffuse cirrhosis. According to the author there was no direct communication between the cirrhotic bands and the thickened capsule so that neither apparently stood in etiological relationship to the other. If Rose's opinion be accepted as correct, the perihepatitis must have been due to some extrahepatic cause, probably peritonitis. We know that peritonitis, both simple and tuber-

culous, is not an infrequent complication of hepatic cirrhosis and even in cases where peritonitis does not obviously exist, there is evidence for thinking that micro-organisms are present though in an attenuated form in the ascitic fluid, showing that the factors for the production of inflammation, namely, infection and a lowered resistance on the part of the tissues, are constantly present. Dr. Maude Abbott (Jour. of Path. and Bact., Edin., Feb., 1900, p. 315) in a case of atrophic cirrhosis of the liver found in the ascitic fluid (the first tapping), removed under aseptic conditions during life, a modified form of the B. coli. In this case the fluid was clear, straw-colored, and there were no symptoms of peritonitis although at death, more than six weeks after, a very slight fibrinous deposit was present upon the intestines. It is interesting to note that both recent and old perisplenitis and perihepatitis were present in this case. Similar results were found in other cases subsequently.

The frequent occurrence of right sided pleurisy in several cases has been noted by several observers, notably Villani and Martini and again by Adami, while the liability of the right pleura to be involved in the "zuckerguss" condition has already been remarked. Although the accumulated facts are as yet scanty, they are suggestive as far as they go of some bacterial irritation of a slight grade going on in these cases.

Packard's case is still more obscure but may be possibly explained on the infective theory although in his case the lesions from their appearance and distribution suggests a very early stage in the process.

It is evident then that we must recognize the following conditions so far as the liver is concerned, the first named being the primary affection :

1. Cirrhosis without perihepatitis.
2. Perihepatitis without cirrhosis (true "Zuckergussleber" of Curschmann).
3. Perihepatitis with cirrhosis (Glissonian cirrhosis).
4. Cirrhosis with perihepatitis.
   - (*a*) By extension of syphilitic hepatitis to the capsule (gumma).
   - (*b*) The perihepatitis secondary to an accompanying peritonitis.

XI. THE FORMS OF PERITONITIS AND THEIR RELATIONSHIP TO "ZUCKERGUSSLEBER."

It will be gathered from what has been already said that there is a close connection between the chronic hyaline or hyperplastic perihepatitis and peritonitis in general. In all our cases and in all but two of Hale White's a fairly diffuse chronic inflammation of the peritoneum was found at autopsy.

Before going further, however, it would perhaps be well to define our terms.

Such expressions as "chronic peritonitis," "perihepatitis," "perisplenitis," etc., are used in a very loose way even by pathologists of repute. At one time is indicated an inflammation present at the time of the examination, at another merely fibrous adhesions about the various organs—relics of an inflammatory process past and gone. Much confusion of ideas has thus been induced. Now, the result of a process is not the process itself, scar tissue is not the wound, nor are fibrous adhesions inflammation. Therefore it is incorrect and misleading to speak of the condition of old adhesion between the liver and diaphragm, for instance, as perihepatitis; such a lesion may be merely evidence of a process that has long ceased to exist. In the following pages, therefore, when such terms are used, they will refer solely to inflammation actually in process at time of observation.

As to the relationship between peritonitis and perihepatitis, considerable light may be gathered from a consideration of the etiology of peritoneal inflammations. Clinical evidence proves that chronic peritonitis may result from an acute lesion, either by a gradual amelioration of its severity or by a succession of relapses and probably most cases originate in this way; or again, the condition may develop insidiously and without preliminary acute manifestations. Both forms may be primary or secondary. A primary peritonitis is defined by Flexner to be "a condition in which the inflammation, usually diffuse, of the serous cavity takes place without the mediation of any of its contained organs and independently of any surgical operation upon these parts." Such peritonitides form a very small proportion of the cases of peritoneal inflammation, and, as Flexner correctly points out, are usually to be regarded as terminal infections; they occur more especially in connection with the infective fevers and in Bright's disease.

From their nature they do not lead to the chronic form and so may be dismissed at once from our consideration. The vast majority of peritonitides originate by extension from some organ in close anatomical relationship to the peritoneal investing membrane. The ways in which they may occur are multitudinous, but perhaps the chief ones may be mentioned, these are: gastric, duodenal or other intestinal ulcers, traumatism, cholecystitis, diseases of the internal female genitalia, abscess or gumma of the liver, hernia, ecchinococcus cysts, carcinoma and amyloid degeneration. But arise where it may, chronic diffuse peritonitis is practically always local at the onset.

In regard to the development of perihepatitis we have to recognize two forms; the first, primary perihepatitis, arising by extension of some inflammatory process, from the parenchyma of the liver to the capsule. Local thickenings of the capsule, for instance, are common, and may arise from passive congestion, tight lacing or other pressure from occupations. The more extensive lesions are generally due to trauma, abscess, acute hepatitis, syphilis, carcinoma or ecchinococcus disease, but with the exception of traumatism, acute hepatitis and syphilis, there is as yet no evidence to show that such lesions ever produce general peritonitis and multiserositis. An interesting case as illustrating the development of extensive chronic peritonitis from trauma is that of Henoch (Deutsche med. Woch., Jan. 7th, 1892); in this case a little girl was kicked by her father in the region of the liver and after some weeks developed enormous ascites and at autopsy an extensive hæmorrhagic and hyperplastic peritonitis was found associated with a bruising and laceration of the liver. By far the vast majority of cases, however, are secondary to peritoneal inflammation originating elsewhere, about the gall bladder, stomach, duodenum, or in the theoracic cavities. As a rule then chronic perihepatitis bears a closer relationship etiologically to chronic peritonitis than it does to disease of the liver.

Besides the peritonitides originating from disease of the viscera just described, which form the majority of instances, certain other forms must be mentioned. Such are the peritonitides that arise in the course of cirrhosis of the liver and chronic Bright's disease. The former has already been dealt

with but the latter demands a word or two here. The peritonitis due to Bright's disease is as yet not well understood. Many writers consider it to be due to a chemical irritation produced by the retention and circulation of toxic substances in the system. This cannot be the whole explanation. As I have remarked before, the probability is strong that in every ascites bacteria are present in the peritoneal cavity and under certain circumstances may start up inflammation. It may be presumed that in such cases micro-organisms invade the cavity by passage through the intestinal wall. Some cases of peritonitis occurring in Bright's disease are probably of this nature, for chronic enteritis and ulceration of the bowel are not infrequent in this affection affording a ready port of entry for such bacteria. The form of disease produced, however, is generally acute sero-fibrinous or fibrino-purulent in character. Whether Bright's disease is a potent etiological factor in the causation of chronic peritonitis or not is at present open to debate. It is certain, however, as I have observed in my own experience, that local peritonitis of the adhesive and fibrino-plastic character and of a somewhat prolonged course, may develop in the neighborhood of uræmic ulcers. Hale White in nineteen of his twenty-two cases of perihepatitis found chronic nephritis present and nearly always albuminuria. As a consequence he rejects the view that the condition is due to portal stasis and expresses the opinion that chronic Bright's disease plays the most important role. Herringham's opinion (loc. cit.) is that disease of the kidneys is more frequently followed by adhesive inflammation than is disease of the heart and liver. Hale White's experience is certainly different from that of the German authorities for nowhere do they suggest a causal relationship between chronic Bright's disease and perihepatitis. In our fourteen recorded cases the kidneys are mentioned seven times. They were practically normal in five cases ; granular in one ; and cortex thin in one. In my own first case, in which the kidneys showed interstitial changes, the disease was scarcely advanced enough to have caused serious results.

It seems to me that it is quite as reasonable to explain the kidney affection in some of Hale White's cases as a condition secondary to gout and alcoholism, which in his opinion were so important as etiological factors, but in the majority as

a result of passive congestion. That albuminuria and casts and even fibroid induration of the kidneys should be frequent in such cases is not strange. In the later stages of perihepatitis venous stasis throughout the body is marked, and we know that this condition frequently reacts upon the kidney to produce these signs. We see the effects of this very well, for instance, in Hale White's second case where albuminuria was present on admission and disappeared after paracentesis. The observations upon the state of the urine during the disease are unfortunately very scanty; when mentioned the amount was said to be greatly diminished; so that the data on which to form a positive opinion are few. It must be said, however that the study of the clinical features of perihepatitis, at least in my opinion, lends no color to the view that chronic Bright's disease is an essential and primary factor. The characteristic features are lacking; vascular changes are not marked, uræmia does not occur nor do the morbid appearances as a rule suggest a primary nephritis. The fact that the kidneys were practically normal in five cases proves that kidney disease is certainly not a necessary condition for the initiation of chronic hyperplastic inflammation of the peritoneal sac. Considering, therefore, the mode of onset, the general experience that when peritonitis does occur in Bright's disease it is acute and often suppurative rather than chronic and that in the great majority of the cases the main factors capable of producing an interstitial nephritis are absent, the probability is strong that chronic nephritis does not play an important part and when present is an associated condition rather than a primary etiological factor. Still it would be unsafe to deny in the absence of more extensive information that it might under certain circumstances play the chief role.

A further important point to be settled is the exact part played by tuberculosis in the etiology of the "zuckerguss" condition.

Louis (quoted by Bauer, v. Ziemsen's Cyclopœdia, 1878, Eng. Transl. Vol. 8, p. 292), was perhaps the first to state that every case of chronic peritonitis was tuberculous, and in this he has been followed by Picchini (loc. cit.). Nothnagel (Specielle Pathologie u. Therap., Intestines and Peritoneum, p. 742), does not, however, take such an extreme

view for he states that while the majority of cases are due to tuberculosis exceptions do occur. It is a striking fact, however, that no case of the "zuckerguss" type of Curschmann has been found due to tuberculosis. Siegert, perhaps the most careful observer of all, after investigation of this question, is positive to this effect. In my own case careful search was made for the tubercle bacillus without avail and this result is, therefore, in accord with the findings of all other observers. In Curschmann's case alone was there found at autopsy a tuberculous lesion, namely, tuberculous peritonitis and pleuritis, but this he regarded as a terminal complication. Picchini's dictum that "in medical literature no case is recorded which demonstrates in a sure and positive manner that subacute and chronic polyorromenitis can exist apart from a tuberculous process" is therefore undoubtedly incorrect. Still, as I shall now proceed to show, the bacillus tuberculosis is quite capable of exciting a chronic hyperplastic inflammation of the serous membranes associated with hyaline metamorphosis very similar to the "zuckerguss" condition. The following cases abstracted in brief will serve to illustrate this point:

CASE 26/98. (R.V.H.)

W.H., æt. 33, a clerk, was admitted to the Royal Victoria Hospital under Dr. James Stewart on the 8th of April, 1898. The autopsy was performed by Professor J. G. Adami, twelve hours after death.

Personal History: Suffered from the usual diseases of childhood, pneumonia at 18. Alcohol to excess.

History of Illness: About the middle of March, 1898, patient began to feel weak and out of sorts; this became gradually worse so that after his day's work he felt completely used up. He was nervous and unable to sleep and his appetite was poor. There was no nausea nor vomiting but slight diarrhœa. On March 23rd a dry, hacking cough started, which continued, though it was somewhat improved at time of admission; with this there was a scanty stringy sputum. On April 4th began to complain of continuous frontal headache of a dull and heavy character but not specially severe.

On Admission: Face flushed, expression listless. T. 101.3°; pulse, 90; respiration, 24.

Vascular System: Pulse regular, full and of low tension. Second pulmonary sound increased. Widal reaction was not present.

Respiratory System: Occasional cough with muco-purulent expectoration.

Digestive System: Tongue coated; bowels regular; spleen and liver not palpable.

Nervous System : Low muttering delirium with muscular twitchings and constant coarse tremor of the fingers and hands.

The *Urine* four days before admission contained a trace of albumin.

From the time of entry the patient was constantly delirious and gradually became weaker and more stuporose. Two days before death, absolute coma. Double optic neuritis was present with small hæmorrhages into the left eye and slight unequality of the pupils.

POST MORTEM EXAMINATION.

Anatomical Diagnosis : Generalized Chronic Hyperplastic Tuberculosis of the Pleuræ and Peritoneum :—Tuberculous Perihepatitis and Perisplenitis ; Miliary Tuberculosis of Heart, Liver, Spleen, Lungs, Kidney and Left Adrenal, Tuberculous Enteritis. Death resulted from Tuberculous Meningitis.

Cultures from the heart, blood and peritoneal cavity were sterile. A smear from the omentum gave the Bacillus tuberculosis.

The interest of this case consisted in the diffuse thickening of the pleuræ and peritoneum, involving chiefly the upper portion of the abdominal cavity and especially the capsul s of the spleen and liver.

The *Liver* was large, weighing 2180 grms. Its upper surface was covered by a layer of thickened connective tissue, averaging 1 cm. thick ; this was firm, homogeneous, very dense and resistent and pulled off with fair ease from the liver substance ; at the hilus of the organ there was also considerable matting with enlarged lymph glands. The gall bladder was distorted and contracted, being enclosed in bands of fibrous overgrowth. Elsewhere the under surface of the liver was relatively free from thickening. On cutting into the organ it was soft and fatty and almost pulpy, containing numerous frequent fibroid miliary tubercles.

The *Spleen* was enlarged, weighing 330 grms. ; the capsule at the upper portion was greatly thickened and adherent to the diaphragm, though not involved to the same extent as the capsule of the liver ; the under surface was relatively free. The organ was congested, moderately firm, containing frequent fibroid miliary tubercles.

Both *Lungs* were adherent by in general thick veil-like bands somewhat firmer on the right side. In the right pleura about the middle, latero-posteriorly, was a thickened mass on parietal pleura, 3 x 1 cm., formed of an encapsulated cheesy nodule. Both lungs were the seat of a desseminated miliary tuberculosis ; both apices were a little puckered and contained small calcareous tubercles.

The mitral valve showed an extreme condition of tuberculous vegetative endocarditis ; the heart was soft and flabby looking and its muscle contained miliary tubercles.

The parietal peritoneum, especially in the upper part from the diaphragm downward, was converted into a cuirass, averaging in thickness 2 cm., of a creamy white color, firm and nodulated in parts. This covered the upper surface of the liver and extended without a break to within an inch or two of the umbilicus. Somewhat lower down the peritoneum showed discrete nodules varying in size up to that of a small pea. Only a few ccm. of fairly clear serum were found in the

abdominal cavity. Just below the edge of the liver was a thickened mass formed of the fused parietal peritoneum and great omentum.

The various coils of the small and large intestines were bound together and to the parietes by abundant delicate veil-like adhesions. Everywhere over the large and small intestines, in the mesenteries, and over the parietal peritoneum, were thickly scattered large fibroid tubercles, often discrete or often fused into small irregular masses.

Microscopical Examination : The *Lung* showed thickly set miliary tubercles of rather large size, many of them with small caseous centres but others tending to be more of a fibroid character. The lung substance was congested, the alveoli contained numerous catarrhal cells with debris ; certain parts of the lung showed an early condition of patchy pneumonia in a stage of red hepatisation going on to grey surrounding some of the tuberculous foci.

Heart Muscle : Cloudy and somewhat congested.

Spleen : Congested and containing a few small caseous nodules ; capsule was considerably thickened and covered with a dense layer of fibrous connective tissue attaching the organ to the diaphragm. The ordinary capsule of the spleen could be traced in a fairly normal manner, Upon this, however, and continuous with it, was a fairly broad mass of connective tissue laid down in somewhat wavy bands and fairly cellular. In this were several large caseous masses surrounded by fairly abundant small round cells. In the upper layer of this where it united with the under surface of the diaphragm the vessels were congested and surrounded by numerous leucocytes. Wherever fibrous tissue was found it was of fairly normal appearance and of the adult type.

Liver : The section was taken through the liver and its fibrous adhesions to the diaphragm ; the liver itself showed very numerous miliary tubercles of small size, some of them caseating. Surrounding this was evidence of considerable necrosis of the hepatic cells many of them being converted into flattened plates staining badly. There was also a fairly diffuse infiltration between the cells of inflammatory leucocytes ; in certain parts the appearances were that of a very early pericellular cirrhosis. The capsule of the liver could be traced in its entirety and upon this was a very thick fibrous layer containing large diffuse caseous masses. Fig. iv. The deeper layers next the liver were composed of wavy bands or laminæ of well formed connective-tissue with fairly abundant nuclei. The caseous masses above this were very large, apparently formed by the fusion of smaller foci and surrounded by a relatively small amount of inflammatory infiltration. Where the fibrous bands become attached to the under surface of the diaphragm they became again more firm though still composed of parallel laminæ, but unlike the deeper portion the fibres tended to be more swollen and hyaline looking with relatively few nuclei.

Suprarenal, showed extreme fatty degeneration and a few miliary tubercles. *Kidney*, several large caseous tubercles visible, organ was congested and there was evidence of very extreme acute parenchymatous nephritis with degeneration.

Section through the thickened peritoneum showed in the main dense fibrous thickening with numerous newly formed vessels, the fibrous tissue being of the adult type ; everywhere congestion and

diffuse infiltration with leucocytes. Very large caseous masses, evidently produced by the fusion of smaller nodules, were present in the broad bands lying in the centre of the fibrous membrane surrounded by fair numbers of leucocytes and showing an occasional giant cell here and there ; from the irregular purple red staining it was possible that there was beginning calcareous degeneration.

Case 28/98 (R.V.H.).

W. B., æt. 19, a laborer, was admitted under Dr. James Stewart on December 31st, 1897. The autopsy was performed three hours after death by Dr. A. G. Nicholls.

Personal History : The usual children's diseases ; no alcoholism.

Family History : Father died of pleurisy at age of 40 ; one brother died of spinal caries ; the other died from possible tuberculosis.

History of Illness : About Dec. 10th, 1897, began to suffer from slight cough without expectoration, this gradually got worse until on Dec. 25th he felt hot and feverish with occasional chills, he also suffered from headache and pain in the left side ; weakness was considerable and steadily progressive, anorexia was present.

On Admission : T. 101.4°, pulse 108, respiration 24.

Vascular System : Heart dulness increased somewhat to the right side ; pulse dicrotic ; heart sounds weak.

Respiratory System : Chest flat ; expansion poor ; especially on right side. There was distinct bulging of the left side. Over the left chest from the fourth and fifth ribs down, both anteriorly and posteriorly, tactile fremitus was absent. Over the same area breath sounds were almost absent and vocal fremitus practically nil ; there was obliteration of Traube's space.

Digestive System : Liver and spleen not palpable, abdomen full but no tumor felt.

Urine: pale, acid, sp. gr. 1006, no albumin and no sugar.

January 5th, crackling rales were heard over the left lung in the infralcavicular region and below the spine of scapula behind. January 14th, rales increased in number ; temperature was septic and emaciation continuous. No tubercle bacilli were found in sputum.

April 9th, nausea, distension of bowels. Death took place on the 15th.

Anatomical Diagnosis : Generalized chronic hyperplastic tuberculosis of pleuræ and peritoneum ; tuberculous perihepatitis and perisplenitis ; bilateral acute tuberculous pleurisy with left hæmothorax ; compression of left lung ; caseation of peribronchial glands ; miliar tuberculosis of lungs, liver, kidneys and spleen ; tuberculous enteritis ; cloudy organs ; hypoplasia of aorta.

On opening the abdomen the visceral and parietal peritoneum was greatly thickened and of an almost gelatinous consistence ; color was yellowish ; in the upper portion of the abdomen the liver, spleen and the omentum were adherent to the parietes necessitating the use of the knife. In the lower half of the abdomen the adhesions were looser and more gelatinous forming numerous small locculi filled with brownish fluid. The lower coils of the intestines were covered with shotty tuber-

cles. The gall bladder was densely infiltrated and adherent on the left side in the region of the kidney.

Both *Lungs* were generally adherent by fairly firm old adhesions. The left pleura was considerably thickened, especially towards the upper portion, forming a dense yellow layer 0.5 cm. thick. The right pleura was thickened but not to the same extent, chiefly on the diaphragmatic surface. The lungs contained numerous large miliary tubercles.

Heart, cloudy, abdominal aorta small.

Spleen, wt., 275 grms., somewhat enlarged, capsule was irregularly thickened ; on section contained large miliary tubercles.

Both *Kidneys* contained miliary tubercles. *Stomach ;* serosa, especially the anterior surface, was diffusely thickened like the rest of the peritoneum.

Liver, 2050, capsule was considerably thickened ; condition of tuberculous perihepatitis. The gall-bladder was surrounded by dense adhesions.

Microscopical Examination : Heart showed some atrophy and cloudy swelling. *Lung* tissue throughout was congested with here and there areas of collapse ; miliary caseous foci were present in fair numbers. Surrounding these were areas of beginning pneumonia, the lung just beneath the pleura was somewhat collapsed and much congested. The visceral pleura was greatly thickened, the layers next the lung being composed of rather dense newly-formed connective tissue containing very abundant small round cells. Just outside this were numerous rather large and diffuse patches of caseation separated by a loose fibrillar material which scarcely stained. Occasionally giant cells were noted at the edge of the tubercles. The outermost portion of all was also very dense, somewhat granular looking, the nuclei very indistinct, there was however evidence of new formation of vessels.

Spleen, much congested, containing fairly large miliary tubercles. *Liver.* The liver substance showed congestion with considerable fatty degeneration ; scattered minute miliary tubercles were observed here and there ; there was a slight increase of the nuclei in the portal sheaths as if from an early acute interstitial hepatitis. The radicles of the portal veins were slightly dilated ; the capsule of the organ was thickened, being composed of dense wavy connective tissue containing numerous small round cells and some small tubercles.

Kidneys, somewhat congested containing rather large tuberculous nodules ; the secreting cells of the tubules greatly swollen and in a state of advanced cloudy swelling, the nuclei being indistinct ; the tubules often containing granular debris.

These cases are both examples of chronic hyperplastic multiserositis, undoubtedly of tuberculous origin and bear anatomically at first sight a striking resemblance to the "zuckerguss" condition. The various layers of the peritoneum are here also greatly thickened by an overgrowth of connective tissue and present a cartilaginous appearance due to hyaline change. The lesions in this form are of two

kinds, multiple small isolated tubercles on the serous membrane together with a small amount of fibrinous exudation and in the more affected portions a continuous dense cuirass-like membrane of whitish color. In most cases this can be peeled off with ease. As in the simple cases the great omentum is much deformed ; the capsules of the liver and spleen are especially involved with the greater part of the peritoneum ; the pleural cavities and the pericardium may be affected in the same way or may be adherent by simple fibrous bands. Microscopically the membrane consists of new connective tissue together with more or less hyaline degeneration, but in addition there is evidence of a more acute process in the presence of abundant fibrin with caseous masses. The main difference anatomically between this form and the true "icing"

FIG. IV.

Tubercular Perihepatitis.

Shews the thick hyaline and caseous membrane produced in the chronic hyperplastic type.

condition is that caseation is superadded to the hyaline degeneration so that the membrane does not altogether present the pearly white appearance of the " icing " condition but is rather more opaque and yellowish. Again, while in true "zuckerguss" condition the exudation is enormous and the adhesions are trifling, in the tubercular form adhesion is more extensive and exudation is relatively slight. In fact the peritoneal cavity may be completely obliterated so that ascites may be absent or at most there may be a few small pockets of exudation

between the coils of the intestine. The membrane produced is never smooth and glistening but always covered with fibrin and shaggy adhesions. The liver and spleen are generally large. Tubercular lesions of the various viscera are common, such as tuberculosis of the lungs, peribronchial and mesenteric glands, and a miliary tuberculosis may end the scene.

Clinically the symptom-complex of Curschmann is lacking; cases run a much more rapid course, the abdominal pain and digestive disturbances are more marked and the temperature is irregularly elevated. So far, however, as the character of the inflammatory process is concerned we see that it differs in no essential particular from that in the true "icing" condition except in the caseation, the specific lesion of a tuberculous affection. Hyaline degeneration with connective tissue hyperplasia are characteristic of both forms. As in the simple type one or more serous membranes may be affected, the peritoneum may be alone involved or the pericardium and pleura as well. In most cases I have seen, the primary focus of infection is in the lungs and the disease of the serosæ appeared to be hæmatogenic in origin. We conclude, therefore, that a tubercular infection may give rise to a chronic multiple hyaloserositis but that both anatomically and clinically considerable differences exist between this and the true "zuckerguss" condition. The clinical differences are, however, more marked than are the anatomical.

A word or two here should be said about certain forms of chronic peritonitis that are of practical importance.

After some study of the various forms it seems to me that we have to recognize three main types, each of which may be tubercular or non-tubercular in origin. The first is CHRONIC EXUDATIVE PERITONITIS. In this there is considerable outpouring of serous, sero-fibrinous or fibrino-purulent fluid; loose plastic adhesions form but fibrous bands are few. The second, CHRONIC EXUDATIVE AND ADHESIVE, presents less exudation, the adhesions are more numerous and firmer. In this form the ascitic fluid is apt to be sacculated off and contracting fibrous band may lead to serious interference with the intestinal functions. The third form is the CHRONIC HYPERPLASTIC or hyaloperitonitis. Here the exudation is trifling, except in the "zuckerguss" type of Curschmann, only a few small pockets being found here and there between the coils of intestine. More

or less generalized adhesions are the rule, but with this there may also be continuous sheets of hyperplastic and hyaline connective tissue covering over the various membranes. An earlier stage is, however, sometimes seen where the peritoneal membrane is for the most part fairly normal in appearance but is studded over with small firm pearly nodules varying in size from a pinhead to a split pea; these are common about the diaphragm. A certain amount of fibrinous exudation goes with this form.*

While these multiple nodules form a well-known type of tuberculous peritonitis, or rather tuberculosis of the peritoneum, it is not generally recognized that an almost identical appearance can be produced in the non-tuberculous form. In the case of hyperplastic inflammation following cholecystitis, which I referred to in a previous page, such a condition was found and might readily have been mistaken for a tuberculous lesion. Search for tubercle bacilli, however, failed to reveal them Confusion between the two types may readily occur. In fact the lesions are so alike that it is only possible to differentiate between them by demonstrating the presence or absence of the tubercle bacilli. It happens not infrequently that in operations upon the abdomen such hyaline nodules are noted upon the peritoneum and they have been mistaken for tuberculosis. No doubt some of the cases of healed peritoneal "tuberculosis" that we hear about have been of this type.

I would suggest, therefore, the following classification for chronic peritonitis, both tuberculous and non-tuberculous:

CHRONIC PERITONITIS
- Exudative.
- Exudative and Adhesive.
- Hyperplastic
  - Sporadic.
  - Diffuse.

* While this article was in the press I have met with a singular instance of a serofibrinous exudate in the peritoneal cavity, with hyaline plaques upon the liver and spleen, and a "zuckerguss" condition of the peritoneum lining the abdominal wall due to diffuse carcinosis.

XII. DIFFERENTIAL DIAGNOSIS.

Differential diagnosis must be made between chronic hyaloserositis, simple and tubercular, cirrhosis of the liver, and carcinoma of the peritoneum. In all these diseases there may be ascites, enlargement of the liver, a certain amount of abdominal pain, and in most of them induration of the great omentum. The pericarditic pseudo-cirrhosis of Pick is not here considered, for in my opinion it does not constitute a distinct disease entity for reasons which have been already sufficiently set forth.

The consideration of the following points will assist in arriving at a right conclusion although in atypical cases considerable difficulty will be met with. The combination of extreme ascites with little or no anasarca, adhesive pericarditis, pleural exudation or adhesion, especially if on the right side, should always arouse suspicion of a "zuckerguss" condition and particularly perihepatitis.

Previous History: A history of some acute inflammatory disease previously is common in hyaloserositis. Most suggestive are pericarditis, hepatitis and perihepatitis, and right-sided pleurisy. If signs of adhesion of the various serous membranes are found the probability is still stronger of perihepatitis being present. Alcohol, gout, and syphilis play but a trivial part in the etiology of hyaloserositis but are of more importance in cirrhosis of the liver. A chronic cough, persistent diarrhœa, a tubercular family taint, point towards a tubercular lesion.

Age: Hyaloserositis is found occasionally in the very young, but as a rule in those about middle life; a tubercular multiserositis is more common in youth than early adult life; cirrhosis of the liver in middle life; and carcinoma of the peritoneum in later life.

Sex: Hyaloserositis is as frequent in males as in females; cirrhosis of the liver is slightly more frequent in males; tubercular multiserositis and carcinoma of the peritoneum are more frequent in females.

In CHRONIC HYALOSEROSITIS with PERIHEPATITIS, diagnosis can often only be made after prolonged observation. Cases last for many years. The clinical picture in most instances is dominated by the signs of adherent pericardium or chronic

perihepatitis. The liver for a long time is enlarged and smooth, but gradually becomes smaller while the spleen gradually enlarges. Ascites is constant and extreme ; anasarca is usually slight although towards the end it may be marked. Fever is usually absent except during an exacerbation of the disease or when some complication such as pneumonia or acute pleurisy supervenes. The main points differentiating it from atrophic cirrhosis of the liver are absence of signs of portal congestion, absence of marked digestive disturbance, and absence of jaundice ; further, the liver never becomes warty. Signs due to cholæmia do not occur. An important practical observation has been made by Hale White (8 and 11) which appears to be borne out by clinical experience. He gives cases to show that patients suffering from atrophic cirrhosis rarely survive more than three or four tappings or occasionally somewhat more. As a rule in this disease when tapping is required, death is near. On the other hand, patients with perihepatitis may be tapped a great number of times with considerable though temporary amelioration of their condition.

Having decided that multiserositis is present, it is next necessary to determine whether it be tubercular or not. PRIMARY TUBERCULOSIS of the serous membrane is rare. Careful examination should be made of the lungs, mediastinal glands, the superficial glands, testes, ovaries and Fallopian tubes, as well as search made in the urine and fæces for tubercle bacilli. In cases without temperature, tuberculin injections may be tried. In tuberculosis the ascites is apt to be loculated rather than free ; the distension is not usually extreme ; abdominal pain and tenderness are apt to be more marked than in simple hyaloserositis. Hectic fever is not unfrequently found. The distension of the abdomen is often uneven owing to irregular dilatation of the intestines. A hæmorrhagic exudate is more in favor of tuberculosis or carcinoma than of ordinary hyaloserositis. Cases may run without fever and intestinal symptoms may be in the background. Constipation sometimes arises from stenosis of the intestine due to inflammatory adhesions. Jaundice may similarly arise from compression of the duodenum and common bile duct. The liver may be considerably enlarged. Pigmentation of the skin has been observed.

In ATROPHIC CIRRHOSIS a history of dyspeptic disorder, alcoholism, or syphilis are important etiological factors. Nausea, vomiting, and, later, gastric or intestinal hæmorrhages are suggestive. Slight jaundice occurs in about 27 per cent. of cases. The liver is often at first enlarged and sometimes after tapping can be made out to be nodular. The omentum is never indurated and contracted ; signs of portal stasis are marked. Fever is usually slight or may be absent. Cerebral manifestations such as coma, delirium and convulsions are not uncommon. In cases where cirrhosis of the liver and chronic perihepatitis are combined the diagnosis may be difficult or impossible. The presence of a nodular tumor in the upper part of the abdomen would exclude a simple atrophic cirrhosis.

In CARCINOMA of the peritoneum the course of the disease is fairly rapid rarely exceeding eighteen months to two years. A history pointing to carcinoma of the stomach or ovaries would be important. When the liver is involved in secondary growths it may be enlarged and jaundice is often present. The advanced age of the patient, cachexia, and digestive disturbances which may be marked, are in favor of carcinoma. The amount of pain is variable and cases may be further obscured by the occurrence of septic peritonitis. There may be a hæmorrhagic or pseudochylous ascites. Advanced age is not an absolute sign for I remember seeing a case of the disease in a young man of twenty-seven.

XIII. CONCLUSIONS.

i. There is an affection of the serous membranes—multiple progressive hyaloserositis—characterized by the formation of a dense fibro-hyaline investment in certain regions.

ii. Anatomically two forms exist—the sporadic and diffuse.

iii. The disease is primarily and essentially due to chronic inflammation and is almost certainly attributable to the action of micro-organisms of low virulence.

iv. The exact nature of the microbic excitants is in many cases obscure but cases undoubtedly exist that are due to the B. tuberculosis.

Cases of "Icing Liver" Recorded.

Author.	Sex.	Age at Death.	Membranes Affected.	Chronicity in Years.	Liver.	Spleen	Pericardium	Right Pleura.	Left Pleura.	Kidneys.	Ascites.	Œdema.
HAMBOURSIN..	Female.	28	Liver capsule, right pleura,	4	Atrophic nutmeg; inter-	Normal.	Adhesions at right	Partial adhesion.	Normal.	.....	Constant	Œdema of legs before

v. Apart from tuberculosis, only one form, namely, chronic hyaline perihepatitis (Zuckergussleber) gives rise to clinical symptoms sufficiently definite to render diagnosis possible.

vi. This form of perihepatitis may exist *per se* but is often secondary to chronic peritonitis, or may be again part and parcel of a generalized affection of the serous membranes.

vii. The most important etiological factors in chronic perihepatitis are in order of frequency—acute and subacute hepatitis, chronic mediastino-pericarditis, chronic peritonitis and chronic pleuritis.

viii. Chronic hyaline perihepatitis, atrophic cirrhosis of the liver, chronic tuberculous peritonitis and carcinoma of the peritoneum, present many features in common ; differential diagnosis is, however, possible in some cases.

ix. Cirrhosis of the liver plays no necessary part in the causation of chronic hyaline perihepatitis although it may account for some rare cases.

x. Four forms of hepatic manifestations are to be recognized : (1) Cirrhosis without perihepatitis, (2) chronic perihepatitis without cirrhosis (Curschmann's Zuckergussleber), (3) chronic perihepatitis with cirrhosis (Glissonian cirrhosis), (4) cirrhosis with perihepatitis.

xi. To insure accuracy and avoid misinterpretation the terms *chronic pleurisy*, *pericarditis*, *perihepatitis*, etc., should be discontinued in speaking of fibrous adhesions due to an inflammation past and gone, and should be restricted to those cases where there is evidence of an active inflammation present at the time of observation.

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